Panasonic

2010 LCD TV Technical Guide

2010-LCD HD/FHD TV (13th Generation)

Applies to models:

TC-L42D2
TC-L37D2
TC-L42U25
TC-L37U22
TC-L32U22
TC-L37X2
TC-L32X2
TC-L22X2
TC-L37C22
TC-L32C22



Panasonic National Training
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⚠ Warning

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Table of Contents

Topics	4	Troubleshooting TCON Problems	42
Highlights	5	Audio Process Circuit	44
Features	7	SOS Detect (Shutdown)	45
Panasonic LED Backlighting Techniques	8	TC-L37U22 Power LED Diagnostic Codes	46
LED Backlighting Techniques	9	TC-L42D2 Power LED Diagnostic Codes	47
2010 D Series	10	1 Blink SOS Circuit	48
2010 U Series	11	3 and 7 Blinks SOS Circuit	51
2010 X Series	12	3 Blinks SOS Circuit Troubleshooting	53
2010 C Series	13	7 Blinks SOS Circuit Troubleshooting	54
Feature Comparison	14	4 Blinks SOS Circuit	55
2010 Series Description	15	4 Blinks SOS Circuit Troubleshooting	56
TC-L37U22 Board Layout	17	iPod SOS Circuit	57
TC-L37U22 Board Layout	18	9 Blinks SOS Circuit	58
TC-L37D2 Board Layout	19	Service Mode	60
TC-L37D2 Board Layout	20	Service Mode Menu (D2 Series)	61
TC-L37D2 P-Board Pictorial	21	D Series Measurements and Adjustments	62
TC-L37D2 A-Board Pictorial	22	How to Enter the Service Mode_ SRV-TOOL	63
TC-L37D2 TC-Board Pictorial	23	How to Enter the Self-check Mode	64
Standby Power_ All except D2 Series	24	Troubleshooting Picture Problems (All Series except D)	65
Standby Power_ D2 Series	25	Troubleshooting Picture Problems (D Series	78
Power-on Part 1_ All Except D2	26	Sound Defect	87
Power On Part 2_ All Series Except D2	28	Panel Free Run Mode	88
Power-on Part 1_ D2 Series	30	Data Copy by SD Card	89
Power On Part 2_ D2 series	32	Data Copy Preparation	90
CPU Commands Explanation	33	Data copy from the TV to SD Card	91
Inverter Circuit and 1 Blink SOS	34	Data copy from the SD Card to TV	92
LED Backlight Control	36	Glossary	93
U and X Series Video Signal Process Circuit	38		
D Series Video Signal Process Circuit	40		

Topics

1. Features
2. Start-up Operation
 - A) Stand by Operation
 - B) Power On Operation
 - C) Voltage Distribution
3. SOS Detect
4. Signal process Circuit
 - A) Video Signal
 - B) Audio Signal
5. Service Notes
 - A) Service Mode
 - B) SRV-TOOL
 - C) Self check
 - D) SD card
6. Troubleshooting
7. Glossary

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Highlights

IPS Panel

The IPS panel in 2010 VIERA models is an LCD panel that provides beautiful viewing from virtually any angle. Colors appear uniform and consistent even when viewed from a wide angle, so images look fresh and natural no matter where you're sitting. The panel's high light transmittance also maximizes the efficiency of the LED backlight.





VA System

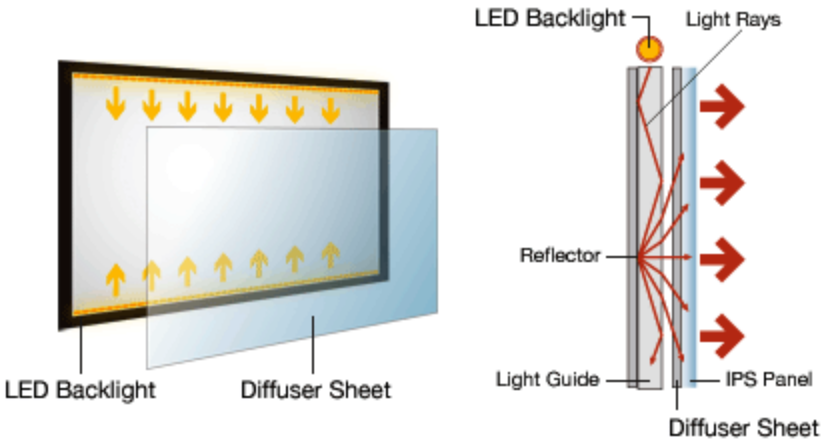


IPS System

Panasonic ideas for life

Highlights

LED Backlight
Boasting a high luminous efficiency, the LED backlight helps deliver a brighter, more vivid picture while using less electricity. You enjoy the kind of bright, beautiful images that make VIERA such outstanding entertainment, while also saving energy.



Intelligent Scene Controller
Intelligent A.I. conducts a detailed analysis of image motion and brightness information to optimize the backlight brightness. This creates sharp images by faithfully reproducing the brightness of each scene while keeping the power consumption low.



Features

Main Differences between the 2010 model and 2009 model

The different point of 37/32 inch 2010 models and 37/32 inch 2009 models are as follows:

- **Audio processor, Micom, HDMI de-multiplexer and video signal processor are integrated to IC8001 Nile Tcon. IC4510 was eliminated.**
- **IC8300 Digital demodulator was eliminated.**
- **Tuner power BT30V was eliminated (Tuner is operated by only 5V).**
- **P4 terminal is integrated to P2 terminal.**
- **A20 terminal is integrated to A03 terminal.**

Panasonic LED Backlighting Techniques

LED-LCD televisions have white LEDs that are arranged around the inside frame of the TV along with a special light diffusion panel designed to spread the light evenly behind the LCD panel. The result is a uniform color range throughout the screen. The technology also allows for thinner panels. IPS panels deliver a 178° wide viewing angle and bright, clear images from most any location in the room, thereby increasing the viewing angle.

Panasonic's top of the line VIERA LED-LCD D2 series features two 1080p Full HD models - TC-L37D2, a 37-inch class (37" measured diagonally) HDTV and the TC-L42D2, a 42-inch class (41.6" measured diagonally) HDTV. The LED method of backlighting the LCD panel allows for the HDTVs to become extremely thin and offers a wider color gamut than traditional back-lit LCDs, which use fluorescent bulbs to provide the light source. Combined with the IPS panel, the viewing angle is improved, contrast is also improved and there is lower power consumption. The D2 series also features the proprietary Universal Dock for iPod®; the VIERA Image Viewer™ to view digital still JPEG photos; VIERA Link™, - a technology that utilizes HDMI-CEC (Consumer Electronics Control) and allows a consumer to operate all VIERA Link™ compatible A/V components using only the TV's remote control; a PC input; 24p Smooth film; 120Hz motion picture Pro 4; four HDMI connections and Clear Panel.

LED Backlighting Techniques

LED Lights the Way to Better Images, Thinner TVs and Energy Savings.
Introducing LED edge-lit technology to the VIERA® 2010 LCD model line-up. Edge lighting uses white LEDs arranged around the inside frame of the TV along with a special diffusion panel designed to spread the light evenly behind the LCD panel. This method of backlighting the LCD panel allows for the LED LCD HDTVs to become extremely thin and offers a wider color gamut than traditional back-lit LCDs, which use fluorescent bulbs to provide the light source. Combined with the IPS panel, the viewing angle is improved, contrast is better and there is lower power consumption.

LED-backlit LCD TVs are considered a more sustainable choice, with a longer life and better energy efficiency than plasmas and conventional LCD TVs. Unlike CCFL backlights, LEDs also use no mercury in their manufacture. However, other elements such as gallium and arsenic are used in the manufacture of the LED emitters themselves, meaning there is some debate over whether they are a significantly better long term solution to the problem of TV disposal in the environment.
Because LEDs are able to be switched on and off more quickly than CCFL displays and can offer a higher light output, it is theoretically possible to offer very high contrast ratios. They can produce deep blacks (LEDs off) and a high brightness (LEDs on), however care should be taken with measurements made from pure black and pure white outputs, as technologies like Edge-LED lighting do not allow these outputs to be reproduced simultaneously on-screen.

2010 D Series

1. **LED Backlight**
2. **120Hz Motion Picture Pro4**
3. **Wide Viewing Angle with IPS Alpha Panel**
4. **VIERA Image Viewer™ (JPEG)**



42 TC-L42D2

37 TC-L37D2

FULL HD 1920×1080p * SD HC HDMI HIGH DEFINITION MULTIMEDIA INTERFACE × 3

High Picture Quality

- Full HD (1080P)
- 120Hz Motion Picture Pro4
- Wide Viewing Angle with IPS Alpha Panel
- Motion Focus Technology
- 2,000,000:1 Dynamic Contrast with Intelligent Scene Controller
- Fine Black Panel

Smart Networking

- VIERA Image Viewer™ (JPEG)
- VIERA Link™
- Game Mode
- PC Input
- Universal Dock for iPod® Included*
- Lower Power Consumption

Others

- Extremely thin

2010 U Series

1. **Wide Viewing Angle with IPS Alpha Panel**
2. **VIERA Image Viewer™ (JPEG)**



42 TC-L42U25, TC-L42U22

37 TC-L37U22

32 TC-L32U22

FULL HD 1920×1080p SD HC HDMI HIGH-DEFINITION MULTIMEDIA INTERFACE × 3

High Picture Quality

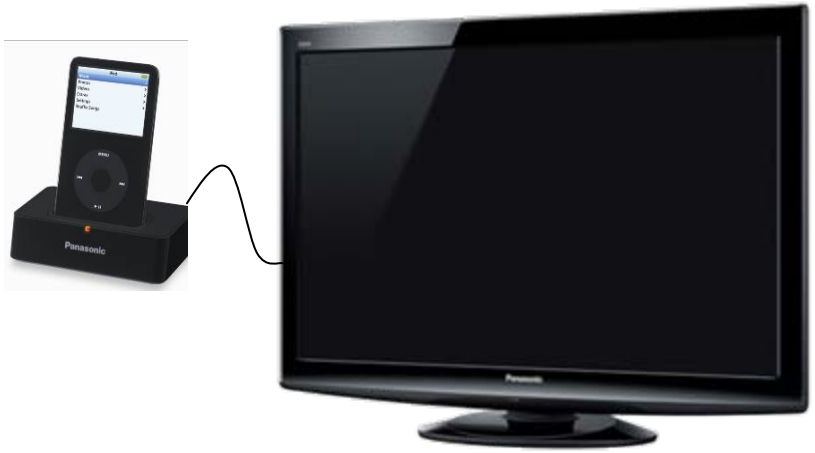
- Full HD (1080P)
- 120Hz Motion Picture Pro4 (TC-L42U25 Only)
- Motion Focus Technology (TC-L42U25 Only)
- Wide Viewing Angle with IPS Alpha Panel
- 20,000:1 Dynamic Contrast with Intelligent Scene Controller
- Fine Black Panel

Smart Networking

- VIERA Image Viewer™ (JPEG)
- VIERA Link™
- Game Mode (TC-L42U25 Only)
- PC Input

2010 X Series

1. **Universal Dock for iPod® Included**
2. **VIERA Image Viewer™ (JPEG)**
3. **VIERA Link™**



SD HDMI × 3**

37 TC-L37X2 **32** TC-L32X2 **26** TC-L22X2

High Picture Quality

- HD (720P)
- Wide Viewing Angle with IPS Alpha Panel***
- 20,000:1 Dynamic Contrast with Intelligent Scene Controller
- Fine Black Panel

Smart Networking

- Universal Dock for iPod® Included*
- VIERA Image Viewer™ (JPEG)
- VIERA Link™
- Game Mode
- PC Input

2010 C Series

1. **VIERA Image Viewer™ (JPEG)**
2. **VIERA Link™**



HDMI ×2**

37 TC-L37C22

32 TC-L32C22

High Picture Quality

- **HD (720P)**
- **Wide Viewing Angle with IPS Alpha Panel*****
- **18,000:1 Dynamic Contrast with Intelligent Scene Controller**
- **Fine Black Panel**

Smart Networking

- **VIERA Image Viewer™ (JPEG)**
- **VIERA Link™**
- **PC Input**

Feature Comparison

FEATURES	TC-L42D2 TC-L37D2	TC-L42U25	TC-L42U22 TC-L37U22 TC-L32U22	TC-L37X2 TC-L32X2 TC-L22X2	TC-L37C22 TC-L32C22
VIDEO					
Panel	IPS 1080p (WSXGA)	IPS 1080p (WSXGA)	IPS 1080p (WSXGA)	IPS (WXGA)	IPS (WXGA)
Backlight	LED	EEFL	EEFL	EEFL	EEFL
Contrast (Dynamic)	2,000,000:1	20,000:1	20,000:1	20,000:1	18,000:1
Viewing Angle	178 degrees	178 degrees	178 degrees	178 degrees	178 degrees
120 Hz	Y (Motion Picture Pro 4)	Y (Motion Picture Pro 4)	—	—	—
24p Smooth Film	Y	Y	—	—	—
Motion Focus Technology	Y	Y	—	—	—
JACKS					
Integrated ATSC Tuner	ATSC/QAM/NTSC	ATSC/QAM/NTSC	ATSC/QAM/NTSC	ATSC/QAM/NTSC	ATSC/QAM/NTSC
VIERA Image Viewer	Y (JPEG playback)	Y (JPEG playback)	Y (JPEG playback)	Y (JPEG playback)	Y (JPEG playback)
HDMI Input	3 (1 side)	3 (1 side)	3 (1 side)	3 (1 side)	2
Audio Input (for Video)	2 (1 side)	2 (1 side)	2 (1 side)	2 (1 side)	2
PC Input	1	1	1	1	1
Digital Audio Output	1 (5.1 ch)	1 (5.1 ch)	1 (5.1 ch)	1 (5.1 ch)	1 (5.1 ch)
CONVENIENCE					
VIERA Link	Y	Y	Y	Y	Y
Universal Dock for iPod	Y	—	—	Y	—
VIERA Tools	Y	Y	Y	Y	Y
Game Mode	Y	Y	—	Y	—

2010 Series Description

D Series FHD	U Series FHD	X Series HD	C Series HD
TC-L42D2	TC-L42U25	TC-L37X2	TC-L37C22
TC-L37D2	TC-L42U22	TC-L32X2	TC-L32C22
	TC-L37U22	TC-L22X2	
	TC-L32U22		

Panasonic's **LED-LCD D2 series** features two 1080p Full HD models - TC-L37D2, a 37-inch class (37" measured diagonally) HDTV and the TC-L42D2, a 42-inch class (42.0" measured diagonally) HDTV. The D2 series introduces LED-backlight technology to the 2010 model line-up. LED-LCD uses white LEDs arranged around the inside frame of the TV along with a special diffusion panel designed to spread the light evenly behind the LCD panel. This method of backlighting the LCD panel allows for the LED-LCD HDTVs to become extremely thin and offers a wider color gamut than traditional back-lit LCDs, which use fluorescent bulbs to provide the light source. Combined with the IPS panel, the viewing angle is enhanced, contrast is also improved and there is lower power consumption. The D2 series also features the proprietary Universal Dock for iPod; the VIERA Image Viewer™ to view digital still JPEG photos with music slideshow capability; VIERA® Link™, - a technology that utilizes HDMI-CEC (Consumer Electronics Control) and allows a consumer to operate all VIERA Link compatible A/V components using only the TV's remote control; a PC input; 24p Smooth film; 120Hz Motion Picture Pro 4; four HDMI connections and Clear Panel.

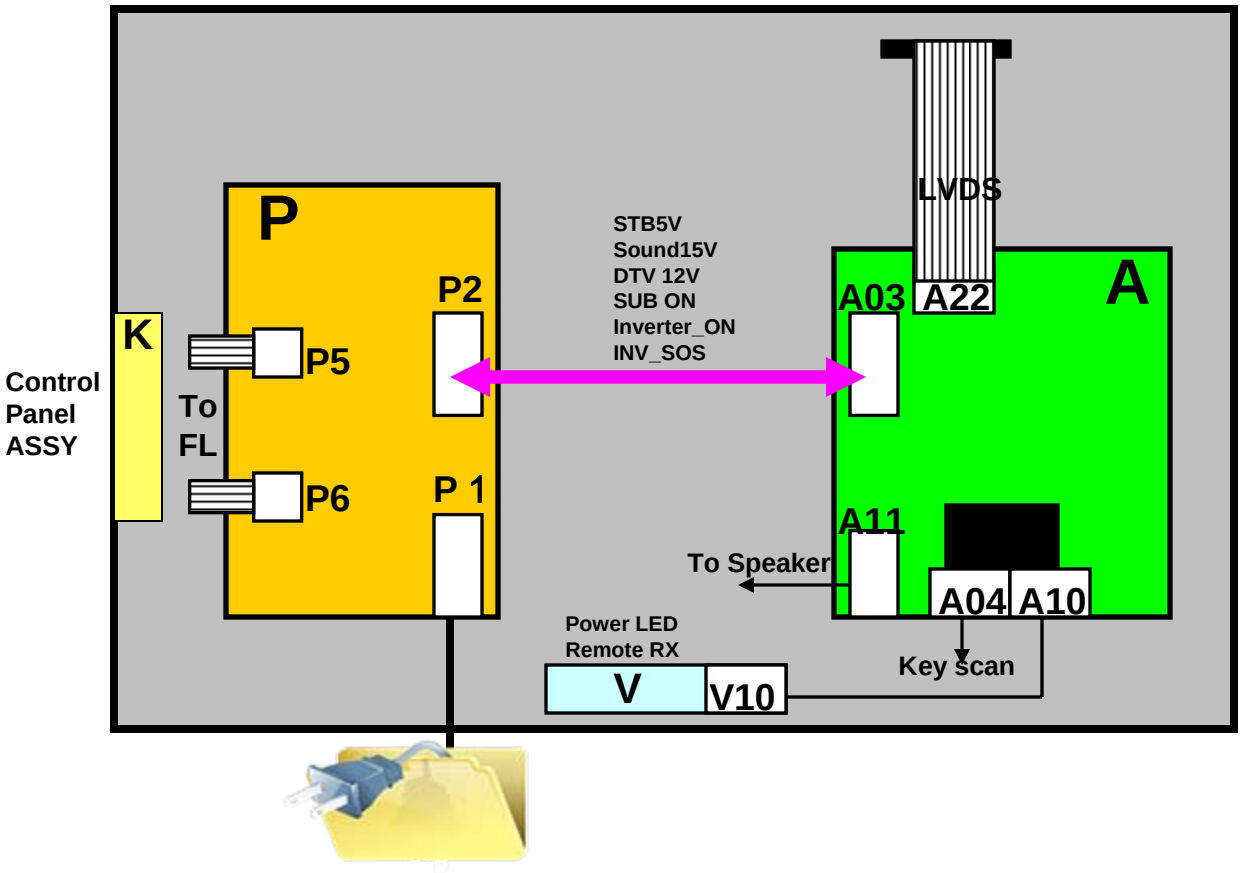
2010 Series Description Continued

Panasonic's **TC-L42U25**, a 42-inch class (42.0" measured diagonally) HDTV, is a 1080p Full HD Resolution HDTV whose features include 120 Hz Motion Picture Pro 4; 24p Smooth film; VIERA Image Viewer to view digital still JPEG images; VIERA Link; three HDMI connections and a PC input. The LCD U22 series presents three screen sizes – the TC-L42U22, a 42-inch class (42.0" measured diagonally) HDTV; the TC-L37U22, a 37-inch class (37" measured diagonally) HDTV and the TC-L32U22, a 32-inch class (31.5" measured diagonally) HDTV. The U22 series of LCD HDTVs features 1080p Full HD Resolution; VIERA Image Viewer to view digital still JPEG images; VIERA link; three HDMI connections and a PC Input.

Panasonic's increased LCD line-up for 2010 continues its expansion with three additional model lines, all with 720p lines of resolution. The **LCD X2 series** includes the Universal Dock for iPod in its three screen sizes and introduces a new 22-inch screen size – TC-L37X2, a 37-inch class (37"measured diagonally) HDTV; TC-L32X2, a 32-inch class (31.5" measured diagonally) HDTV and TC-L22X2, a 22-inch class (21.6" measured diagonally), HDTV. In addition to the Universal Dock for iPod, the X2 models include the VIERA Image Viewer to view digital still JPEG images; VIERA Link; three HDMI connections and a PC Input. Improvements to iPod Dock make it easier to use with iPhone and iPod Touch. TC-L32X2 and TC-L22X2 feature Clean Touch bezel, designed to keep the TV bezel looking best with less fingerprints.

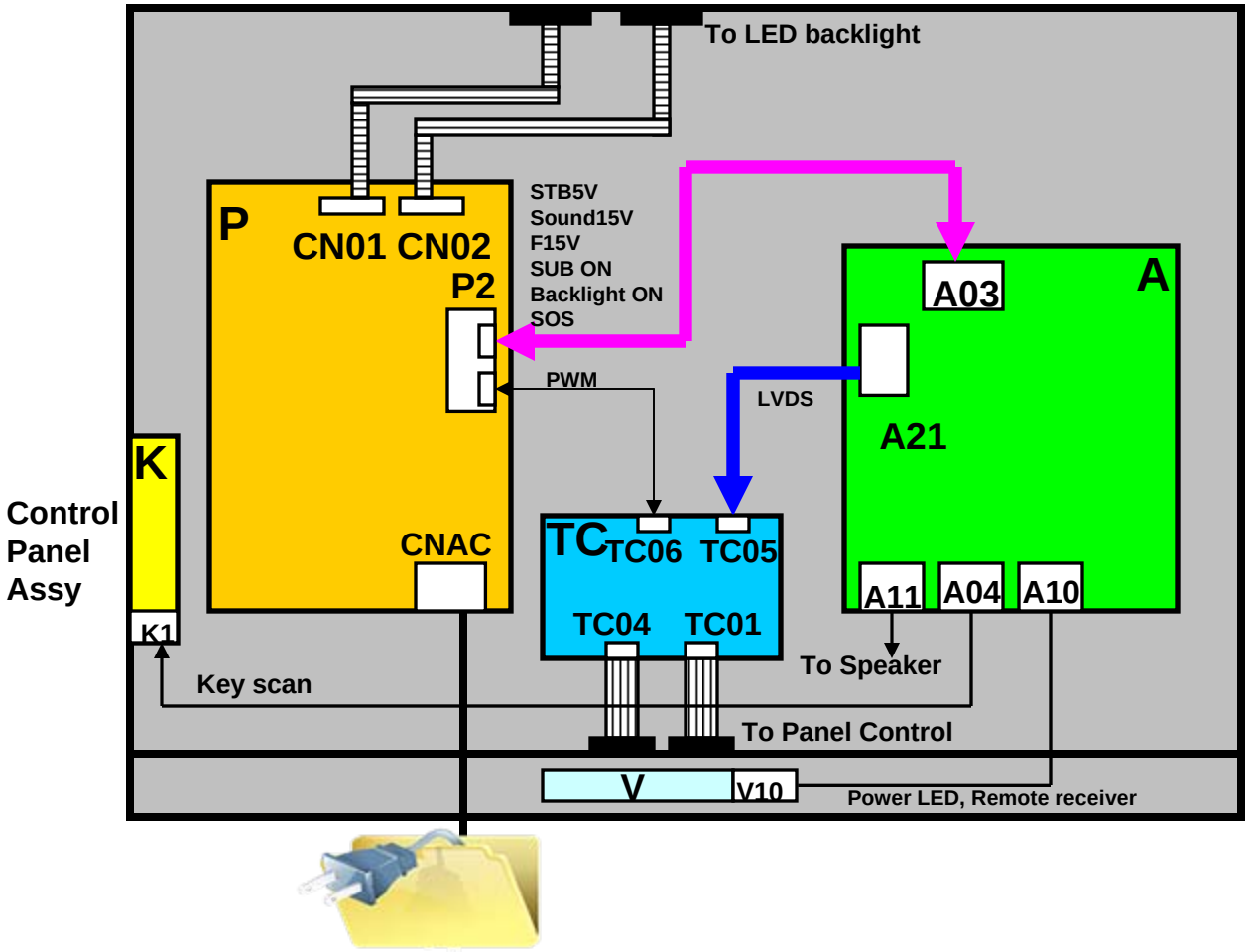
The **LCD C22 series** consists of two screen sizes – the 37-inch class (37" measured diagonally) TC-L37C22 and the 32-inch class (31.5" measured diagonally TC-L32C22. Both are 720p HDTVs and feature VIERA Image Viewer to view digital still JPEG images; VIERA Link; two HDMI inputs and a PC input

TC-L37U22 Board Layout



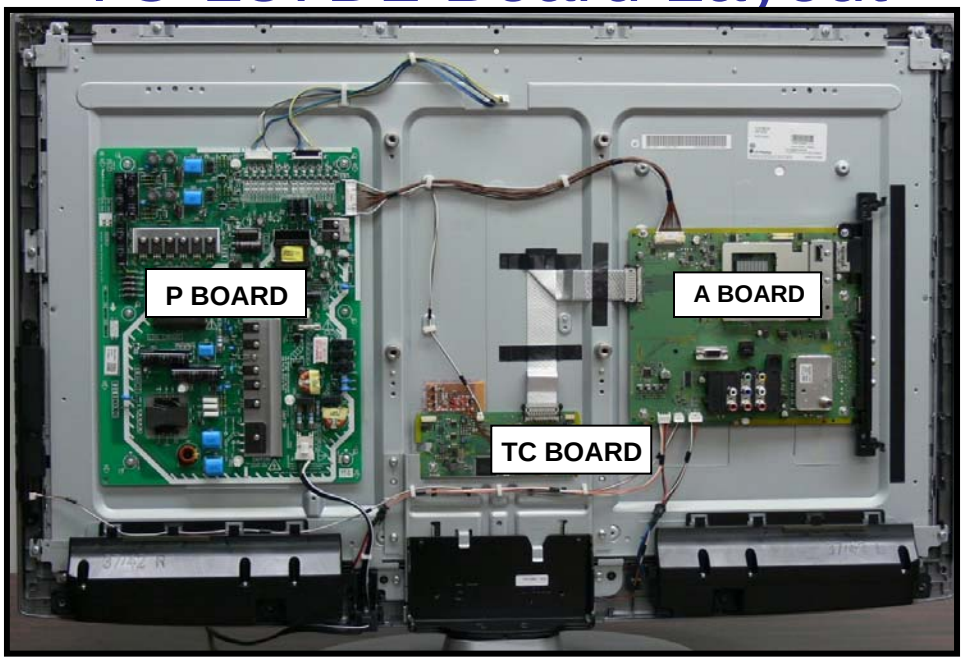
Board Name	Function
A-Board	Rear Terminal, AV Switch, MCU, Audio & Video Processor, LVDS, Tuner
V-Board	Remote Receiver, LED
P-Board	Power (AC/DC), DC-DC
Control Panel Assembly	Control Button, Power switch, (K BOARD)

TC-L37D2 Board Layout



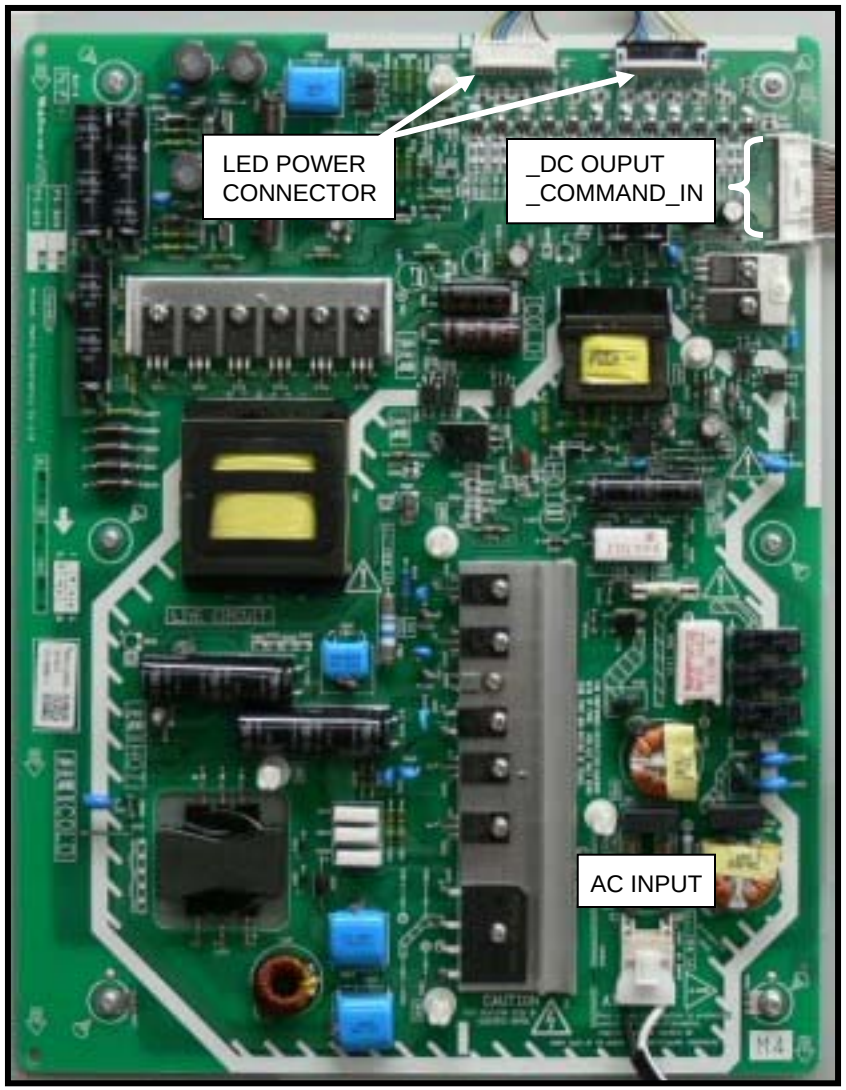
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TC-L37D2 Board Layout



Board Name	Function
A-Board	Speaker out, AV Terminal, HDMI in, SD Card, PC in, iPod Digital Signal Processor, Nile-Tcon, Tuner, Non Serviceable
V-Board	Remote Receiver, LED
TC-Board	T-CON, Non Serviceable
P-Board	Power (AC/DC), DC-DC Non serviceable P-Board should be exchanged for service.
Control Panel Assembly	Control Button, Power switch Non serviceable Control Panel Assembly should be exchanged for service.

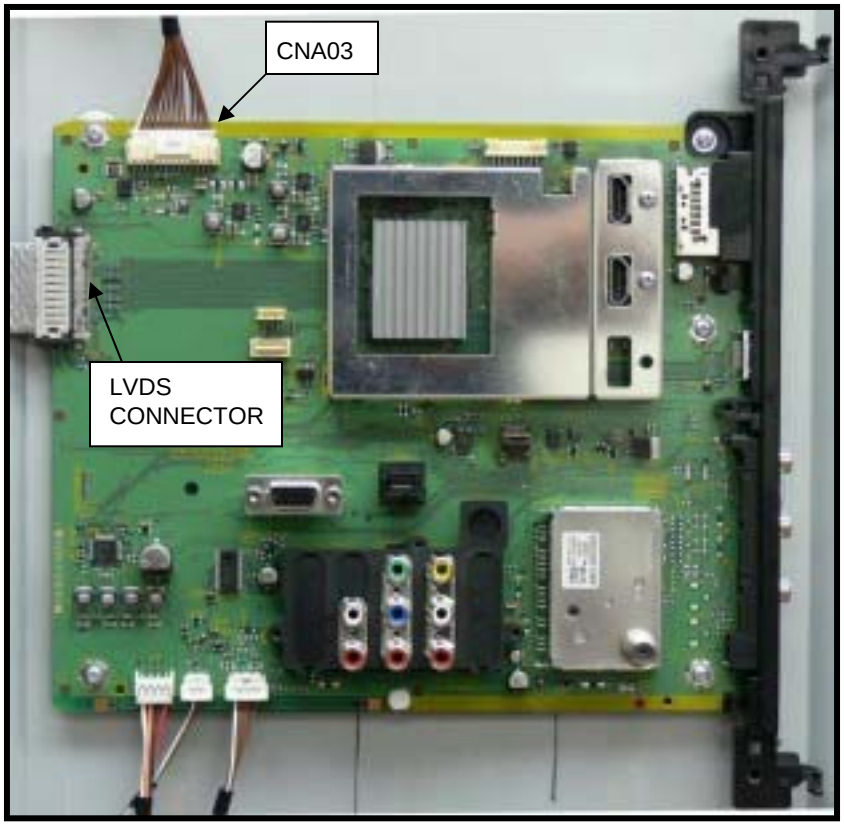
TC-L37D2 P-Board Pictorial



Non serviceable

1. Power (AC/DC), DC-DC
2. P-Board should be exchanged for service.

TC-L37D2 A-Board Pictorial

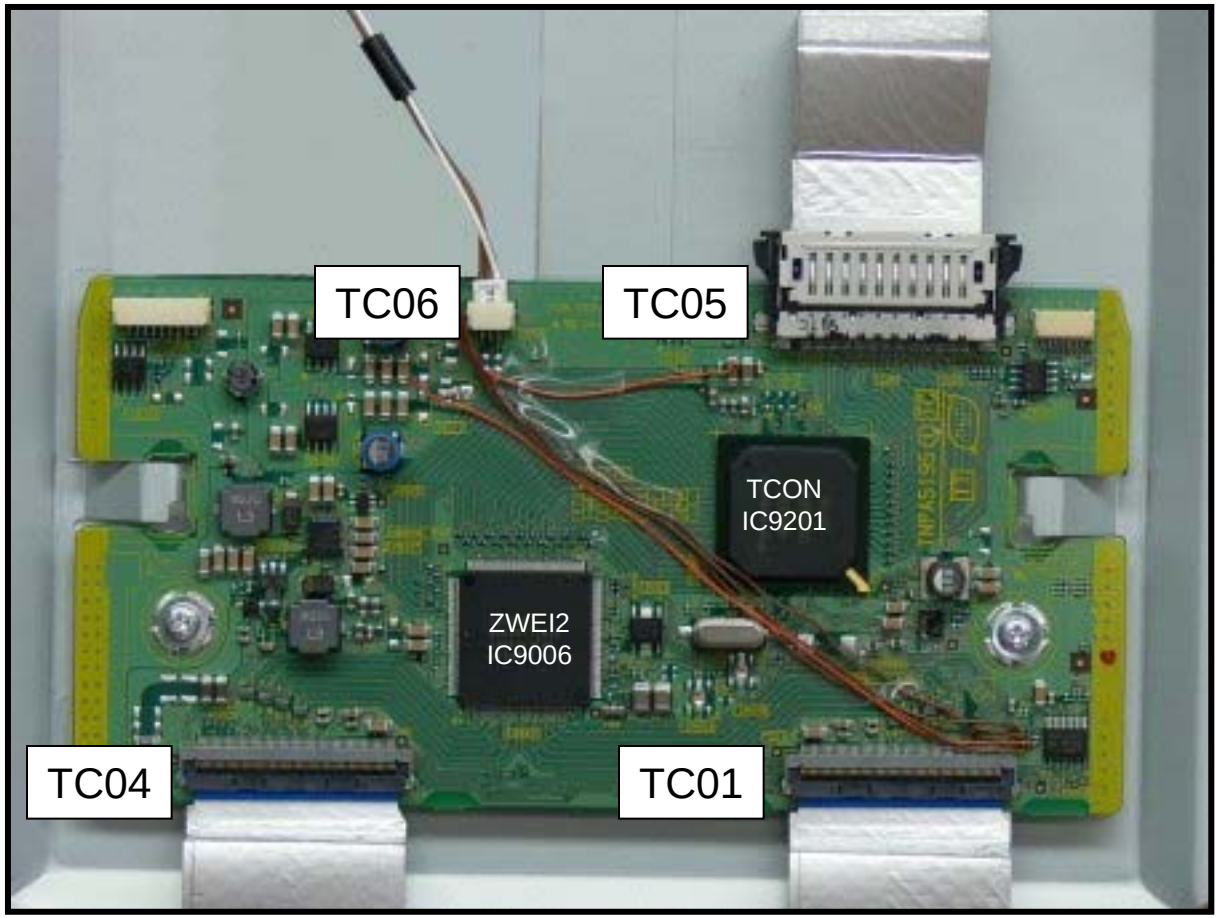


Non serviceable

Nile-Tcon (System Control):

1. Audio Input Terminal, Audio Processor, Audio Amplifier, Speaker out
2. Video Input Terminal, HDMI in, SD Card, PC in, iPod in, Component Input, Video Input, Tuner (TV Reception), Digital Signal Processor, LVDS Output
3. A-Board should be exchanged for service.

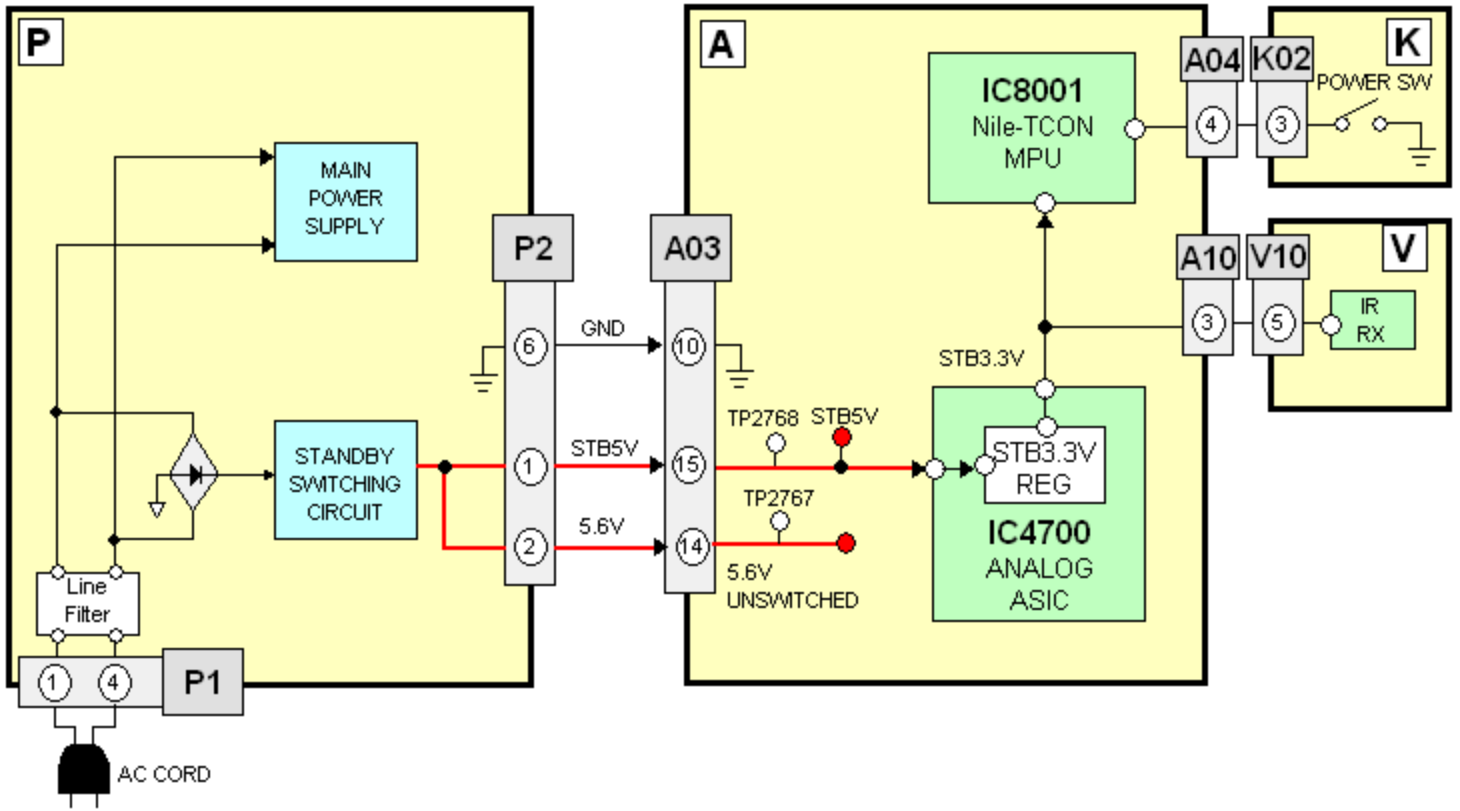
TC-L37D2 TC-Board Pictorial



LVDS Receiver
Timing Control

The serialized data (LVDS) from the A-board is converted to parallel by the ZWEI2 IC. The data is then processed by the timing control IC (TCON) to convert the RGB data into serial streams for processing by the drivers of the LCD panel. The drivers are mounted on circuit boards to the top and side of the panel. Shift registers and drivers provide the drive signals to the rows and columns of pixels on the panel.
The TCON IC produces the data that drives the LCD panel.

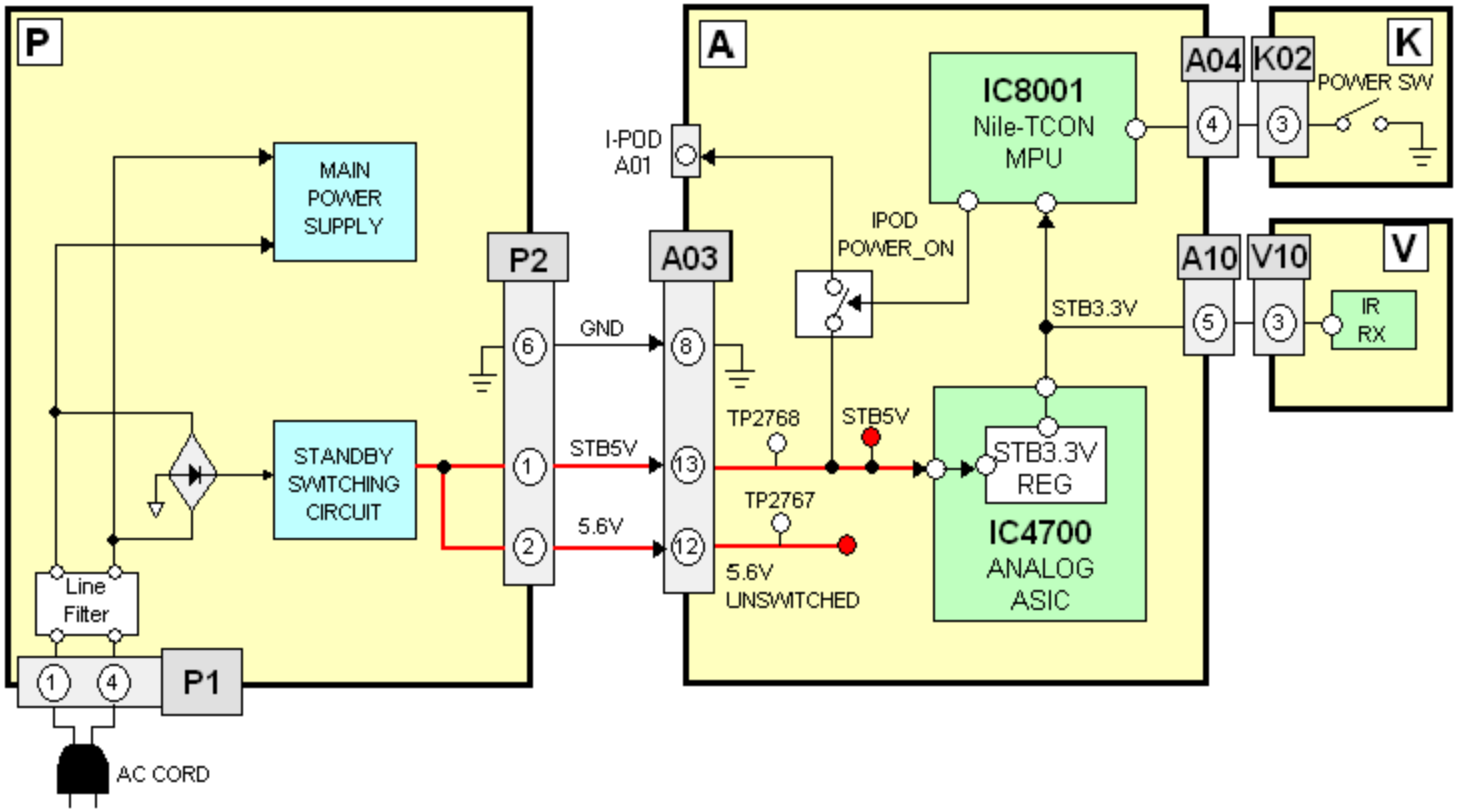
Standby Power_ All except D2 Series



When the TV is plugged in, AC voltage is applied to the standby circuit of the power supply circuit to produce STB5V. The STB 5V is provided to the A board via pin 1 of connector P2.
The STB 5V enters the application specific integrated circuit (ASIC), IC4700, for conversion to STB3.3V. The STB3.3V is applied to IC8001 to energize and prepare the internal microprocessor for program execution.
The 3.3V from the voltage regulator is also applied to the remote control receiver and the power LED on the K board through Pin 3 of connector A10.

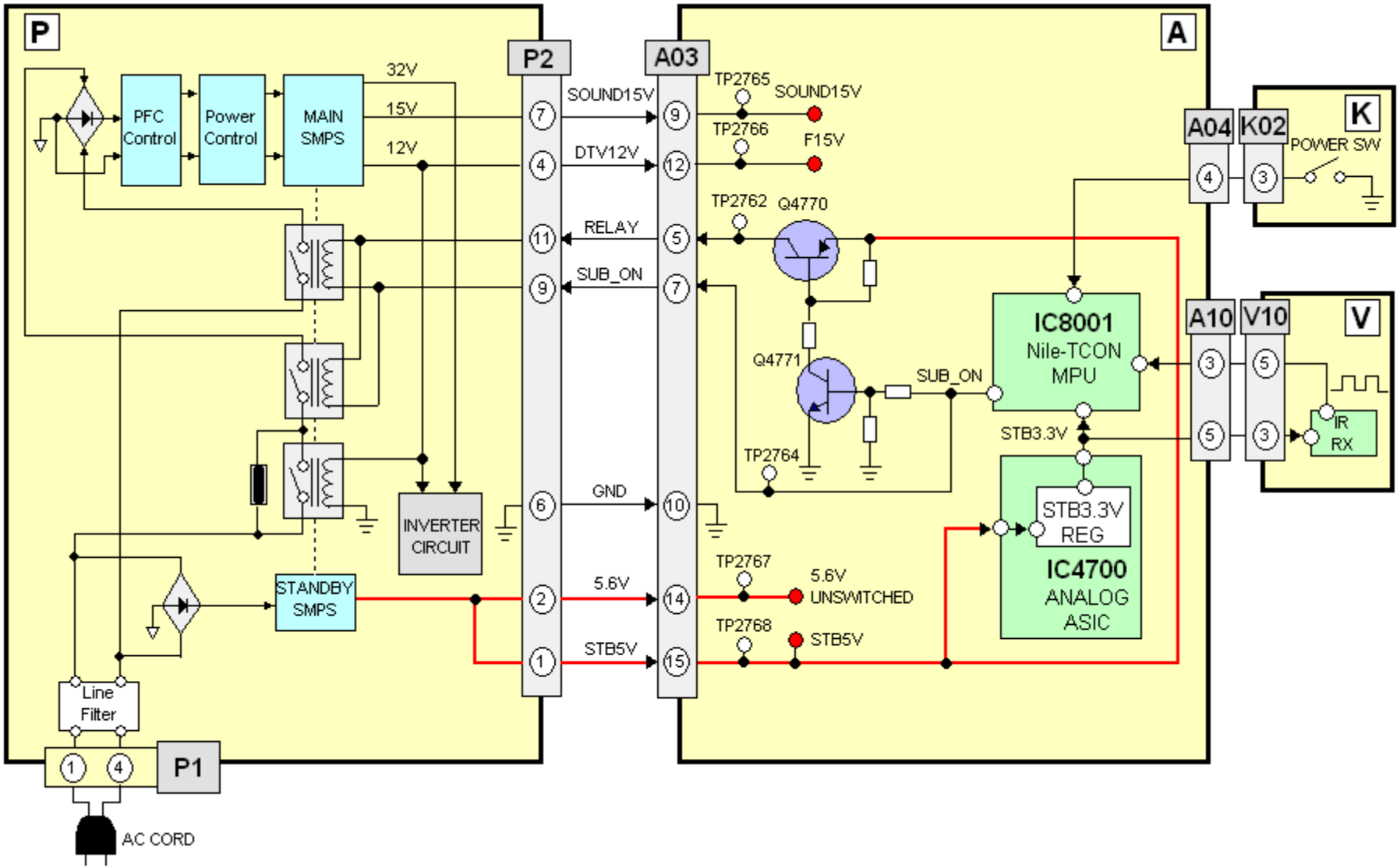
If the STB5V is missing, the TV is dead (No power)

Standby Power_ D2 Series



When the TV is plugged in, AC voltage is applied to the standby circuit of the power supply circuit to produce STB5V. The STB 5V is provided to the A board via pin 13 of connector A03.
The STB 5V enters the application specific integrated circuit (ASIC), IC4700, for conversion to STB3.3V. The STB3.3V is applied to IC8001 to energize and prepare the internal microprocessor for program execution.
IC8001 outputs the iPod POWER_ON command to turn on the switch that provides STB5V to the iPod connector.
The 3.3V from the voltage regulator is also applied to the remote control receiver and the power LED on the K board through Pin 5 of connector A10.
If the STB 5V is missing, the TV is dead (No power)

Power-on Part 1_ All Except D2



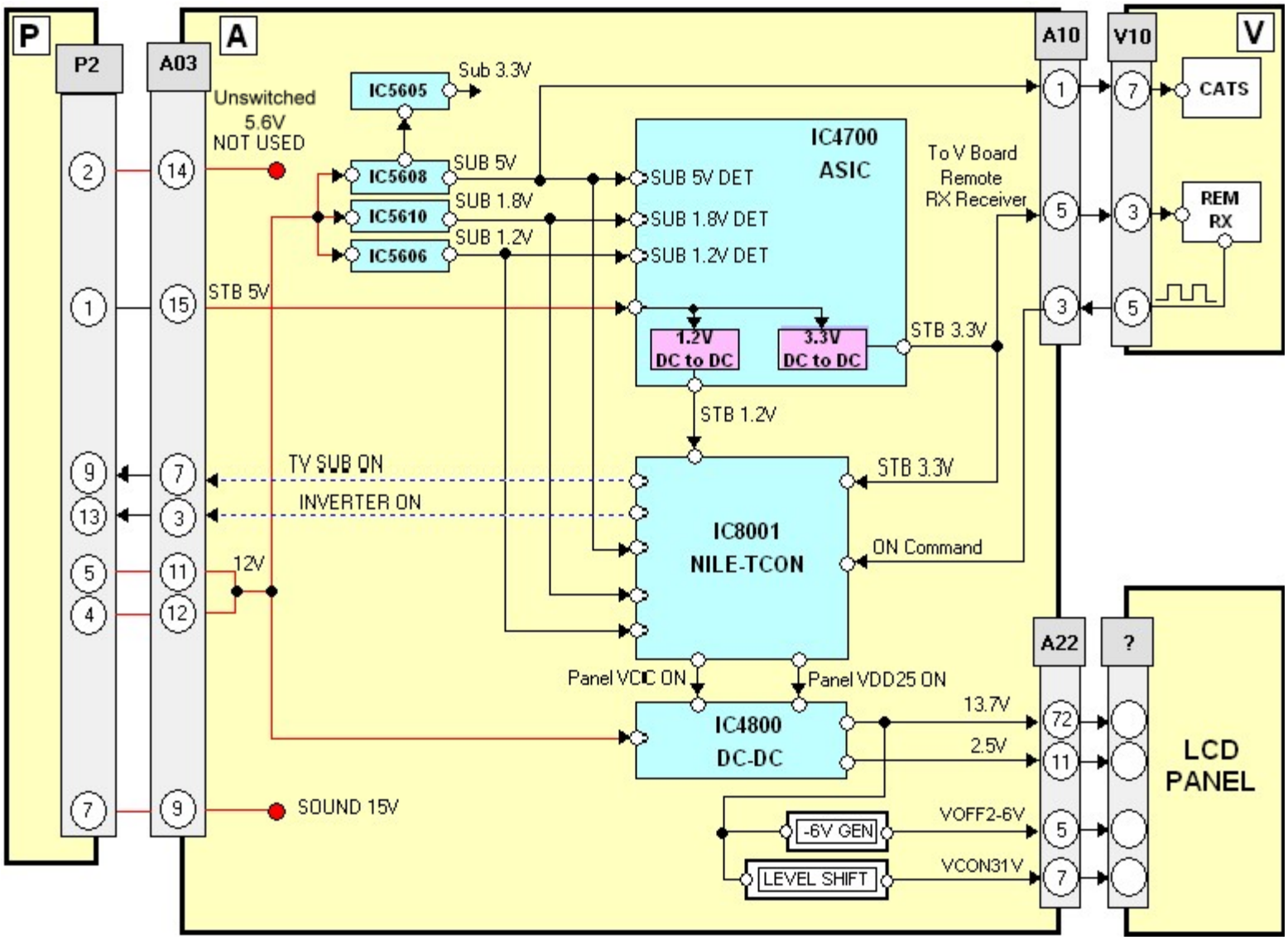
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Power-on Part 1_ All Except D2

When the power button of the TV or remote control is pressed, The MPU (IC8001) of the A board outputs the TV_SUB_ON command to turn on the transistors Q4770 and Q4771 which provide STB5V to the power relay. The STB5V enters the power supply board via pin 11 of connector P2. The TV_SUB_ON command is also provided to the power supply to activate a circuit that provides a ground connection to the relay. When the relay is closed, the switched mode supply goes in operation to create the Sound15V, and DTV12V. The DTV12V is regulated to other voltages to power the A-Board.

Caution: All boards in the unit are to be exchanged only.

Power On Part 2_ All Series Except D2



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Power On Part 2_ All Series Except D2

After sending TV SUB On command, F15V and Sound 15V are supplied to A board.
The F15V source also known as the DTV12V is supplied to DC/DC converters,
IC5608, IC5606, IC5610 and Q5412.

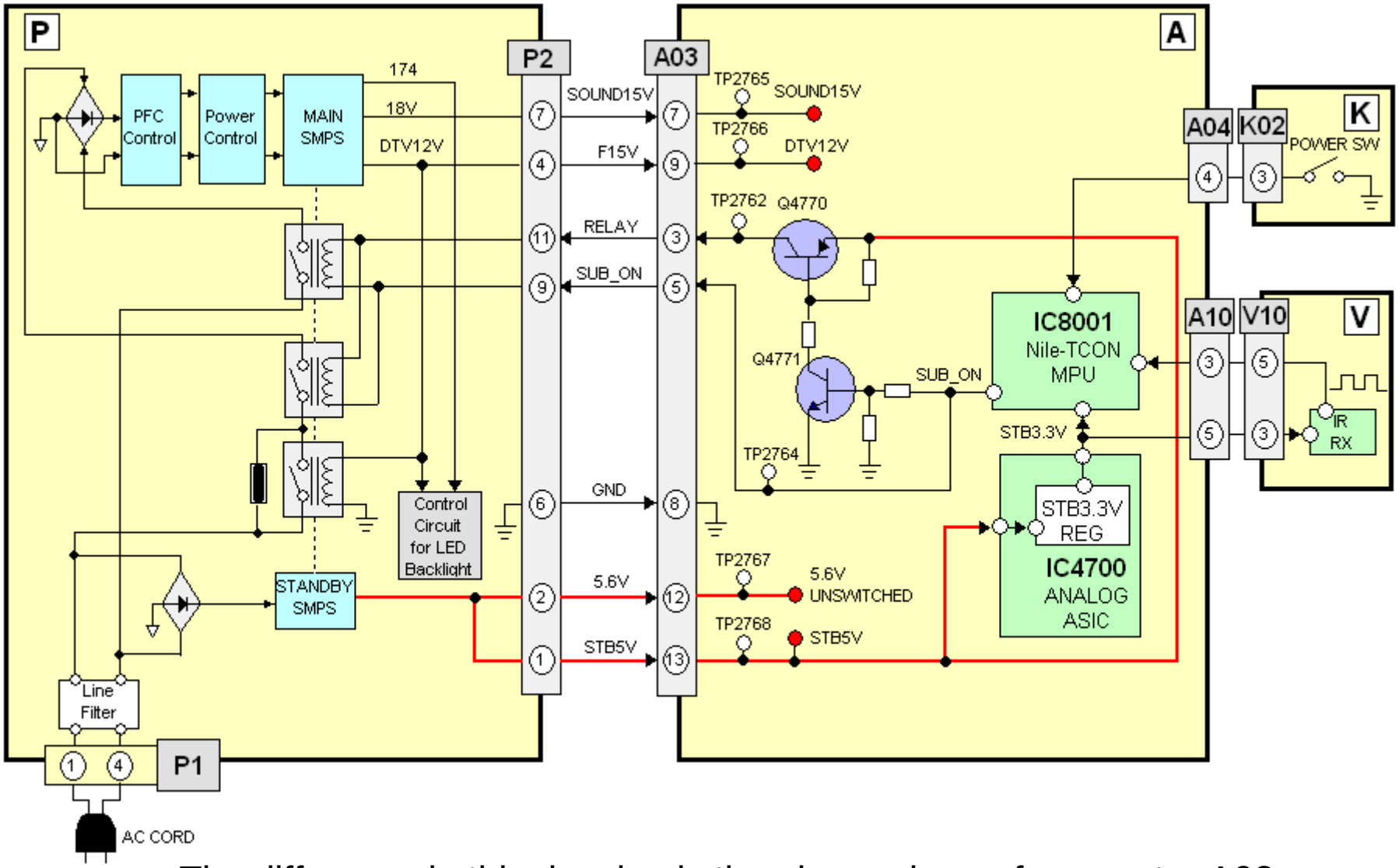
Provided by IC8001, the panel VCC-ON command turns on IC4800 to produce 13.7V and 2.5V for the operation of the TCON circuit located inside the LCD panel.

On the other hand, the F15V enters IC5608 for conversion to SUB5V.
The F15V is also applied to IC5606 for conversion to SUB1.8V.
IC5610 also converts the F15V to SUB1.2V. The sub-voltages are mainly used to power the A-Board. They are all monitored by the IC4700 and subsequently IC8001 for their presence. If any of the sub-voltages is missing, the MPU shuts down the TV and the power LED blinks 3 times.

IC5605 and IC5013 convert SUB 5V to SUB 3.3V.

When IC8001 is satisfied of the presence of all the monitored sub-voltages, it provides the Backlight_On command to turn on the inverter (Power supply for the backlights). This command enters the P-Board via pin 13 of connector P2. The output of the inverter is in the 2.3KVp-p range for a TC-L37X2 panel.

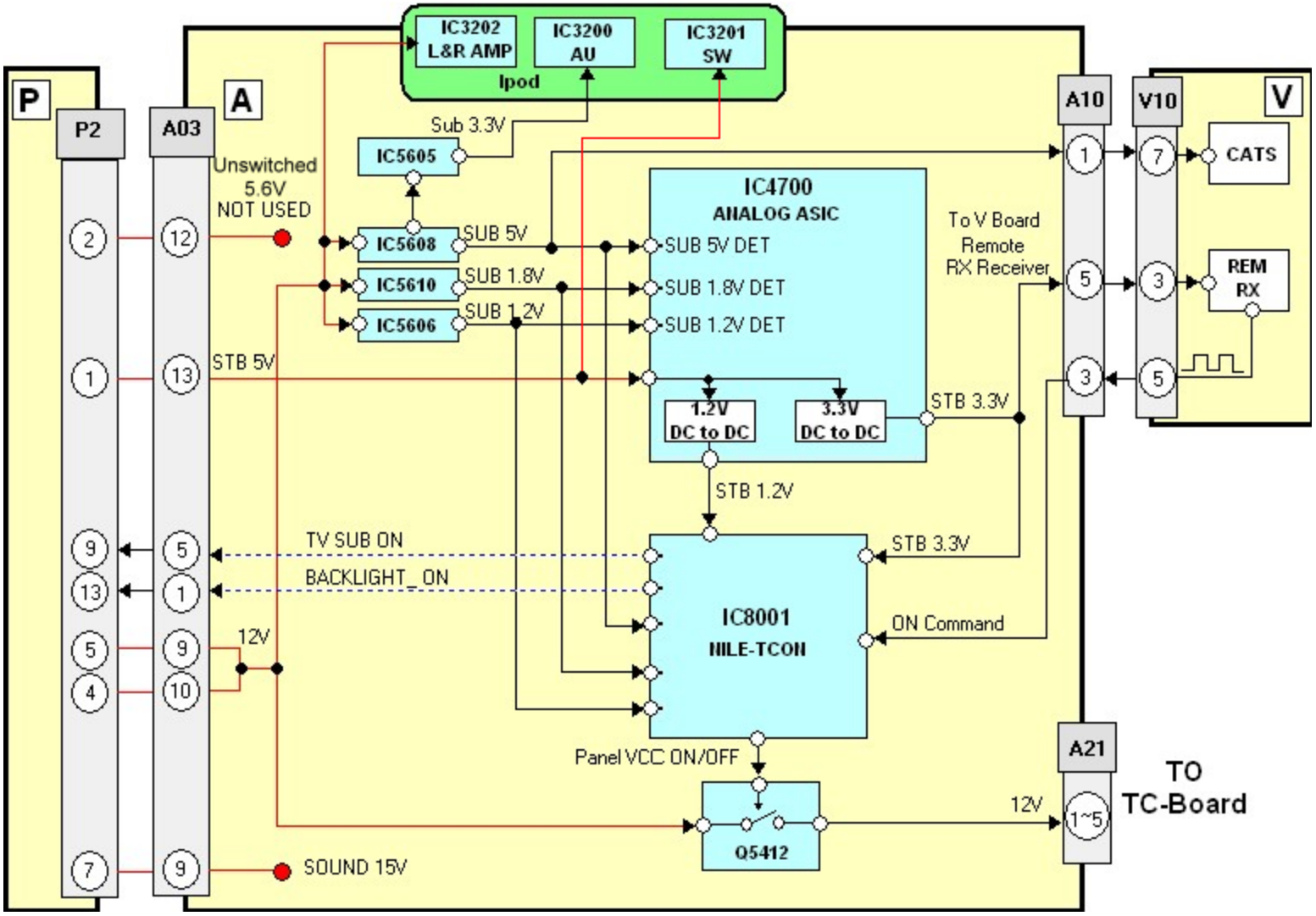
Power-on Part 1_ D2 Series



The difference in this drawing is the pin numbers of connector A03.

Panasonic ideas for life

Power On Part 2_ D2 series



Panasonic ideas for life

Power On Part 2_ D2 series

After sending TV SUB On command, F15V and Sound 15V are supplied to A board.
The F15V source also known as the DTV12V is supplied to DC/DC converters,
IC5608, IC5606, IC5610 and Q5412.

Provided by IC8001, the panel VCC-ON command turns on the transistor Q5412 to supply 12V to the TC-Board. The 12V enters the TC-Board via connector A21.

On the other hand, the F15V enters IC5608 for conversion to SUB5V.
The F15V is also applied to IC5606 for conversion to SUB1.8V.
IC5610 also converts the F15V to SUB1.2V. The sub-voltages are mainly used to power the A-Board. They are all monitored by the IC4700 and subsequently IC8001 for their presence. If any of the sub-voltages is missing, the MPU shuts down the TV and the power LED blinks 3 times.

IC5605 and IC5013 convert SUB 5V to SUB 3.3V.

When IC8001 is satisfied of the presence of all the monitored sub-voltages, it provides the Backlight_ On command to turn on the inverter (Power supply for the backlights). This command enters the P-Board via pin 13 of connector P2.

CPU Commands Explanation

TV SUB ON ①

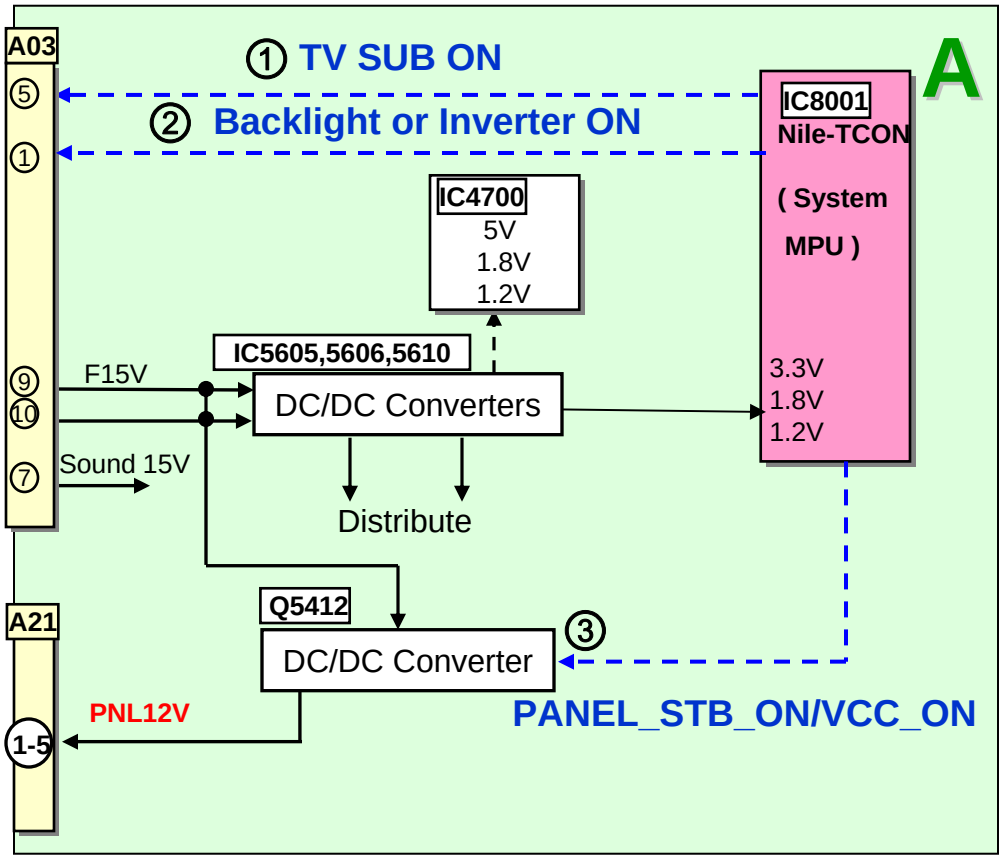
The SYSTEM MPU on the A board outputs the "TV SUB ON" command (3.2V) when the power is turned on. This command is used to turn on the circuit in the power supply that generates F15V and Sound 15V.
F15V is provided to the A board to generate the sub-voltages used by the signal process circuit. The outputs of the sub-voltages 5V, 1.8V and 1.2V are confirmed by ASIC IC4700.

Backlight ON ②

After receiving SUB3.3V, 1.8V, 1.2V, "Backlight ON" command is applied to the P board power supply from Nile-TCON IC8001 to turn on the P board circuits to start backlight circuit.

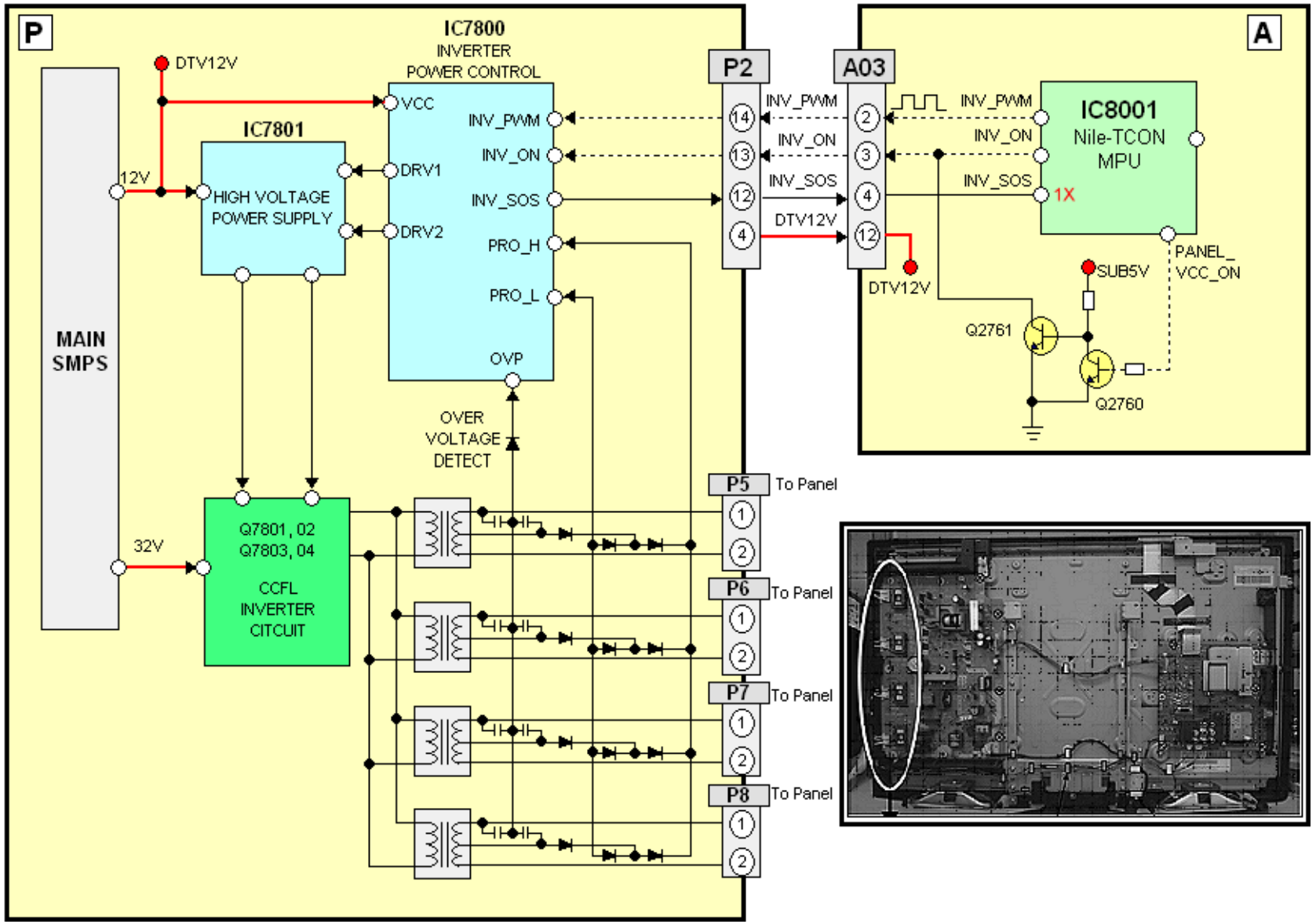
Panel STB ON / VCC ON ③

On the other hand, IC8001 starts the DC/DC converter Q5412 to supply 12V to TCON board.



Panasonic ideas for life

TC-L32U22 Inverter Circuit and 1 Blink SOS



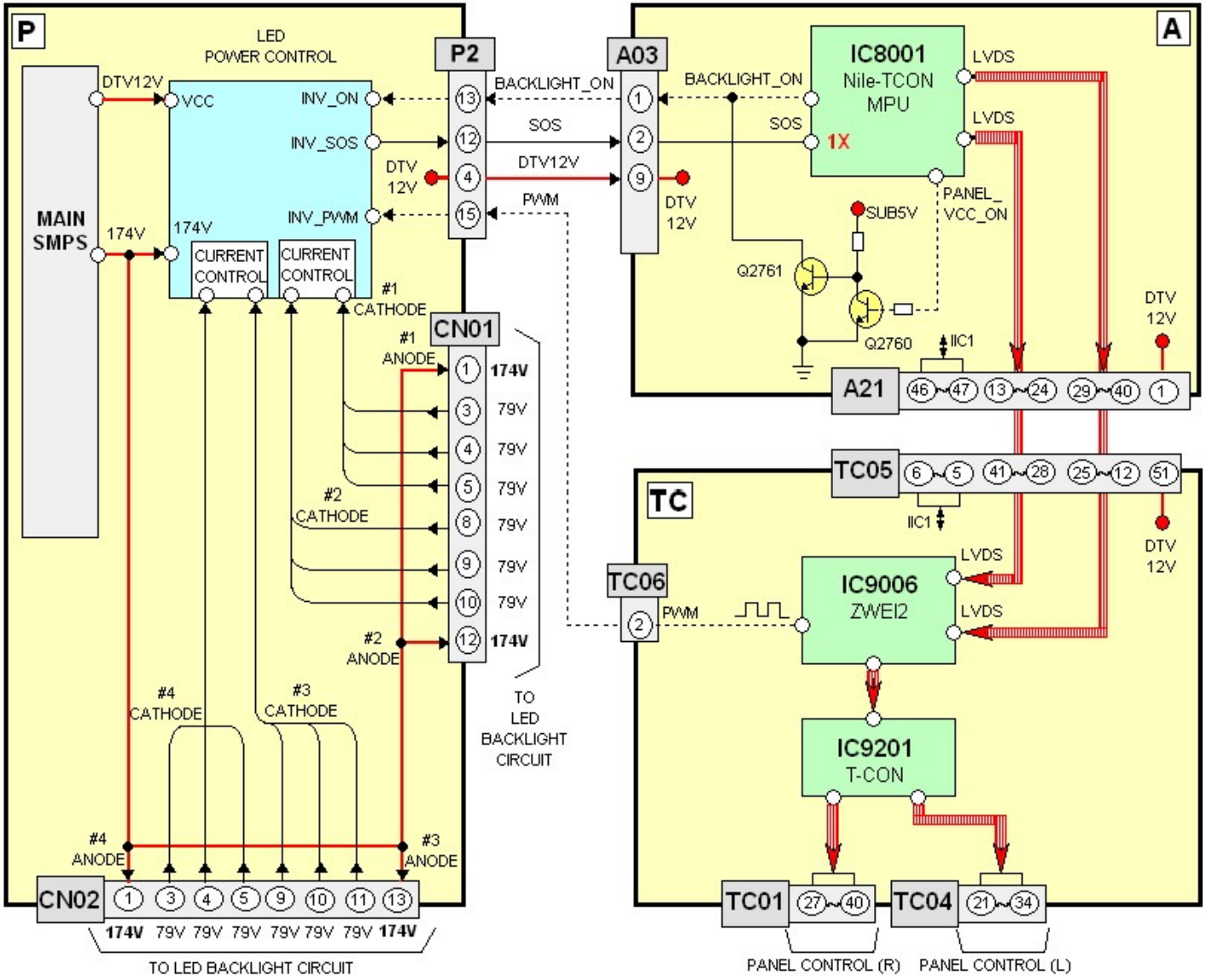
Panasonic ideas for life

Inverter Circuit and 1 Blink SOS

The INV_ON/OFF command (high) of the MPU, IC8001 of the A board, enters the P-Board to turn on the inverter circuit. The inverter circuit produces AC voltages that power the backlight fluorescent lamps . The output of the inverter, approximately 2Kvp-p is provided to the LCD panel via the connectors P5, P6, P7 and P8.
To avoid catastrophic failures, when the inverter circuit is defective, the INV_SOS command is output to IC8001 to trigger the shutdown of the TV. The power LED blinks one time. The same operation takes place when there is an impedance mismatch between the Panel and the inverter. IC7800 is the controller. IC7801 is the oscillator that provides the switching signals to the transistors Q7801 through Q7804.

The backlights are manipulated (dimmed) by the control signal INV_PWM coming from the main board Via pin 12 of the connector P2.

LED Backlight Control



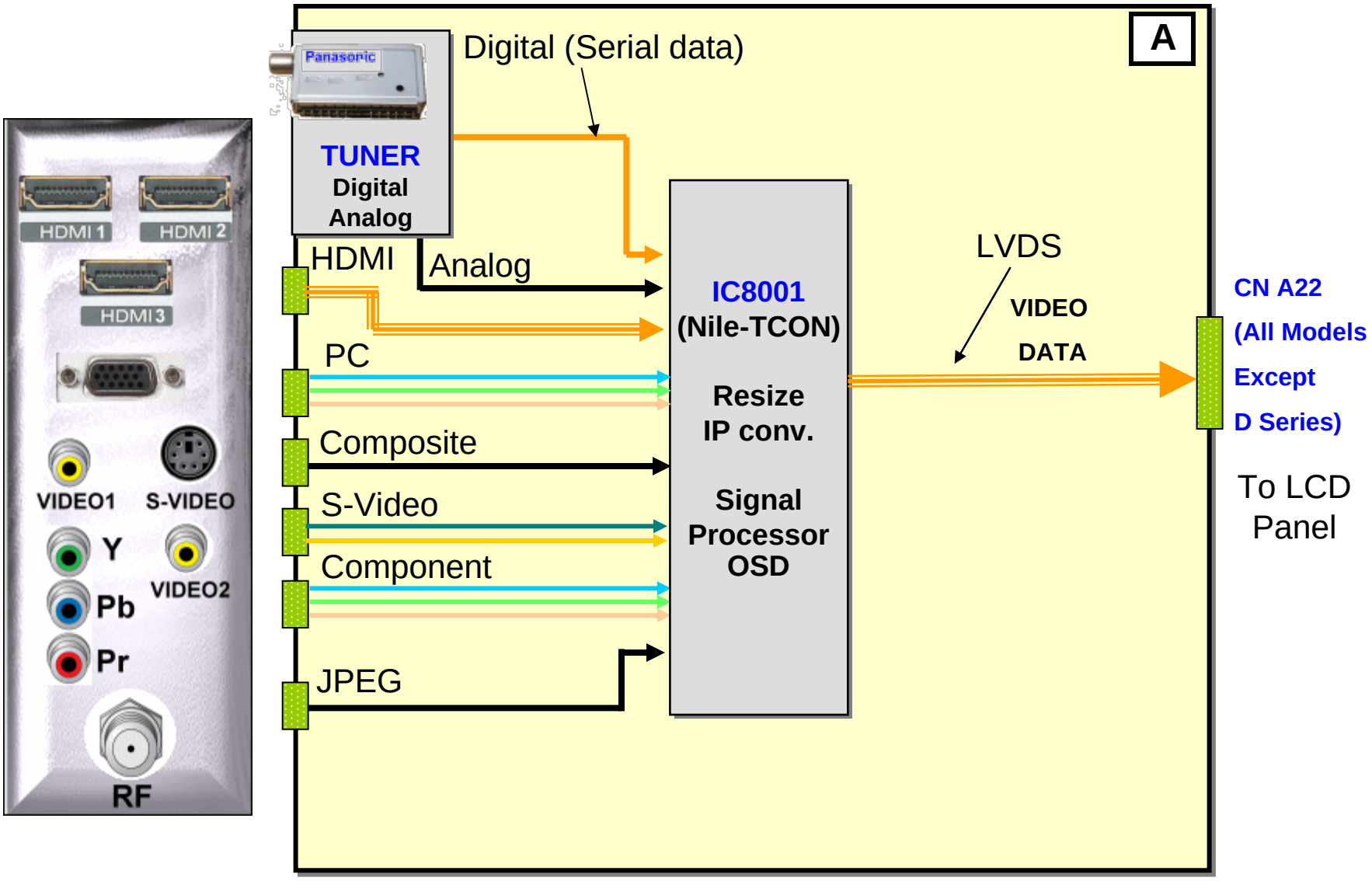
Panasonic ideas for life

LED Backlight Control

The inverter receives 174V from the SMPS. The 174V source is provided to the panel to power the LED. The Backlight_On command from pin 13 of connector P2 starts the inverter drive signals. The inverter control signal, PWM, is delivered by the TCON board at pin 15 of connector P2 to control the brightness of the LEDs. The inverter is responsible for controlling the amount of current passing through the LEDs.

To avoid catastrophic failures, when the inverter circuit is defective, the BACKLIGHT_SOS command is output to IC8001 to trigger the shutdown of the TV. The power LED blinks one time.

U and X Series Video Signal Process Circuit



Signal Process Circuit Explanation

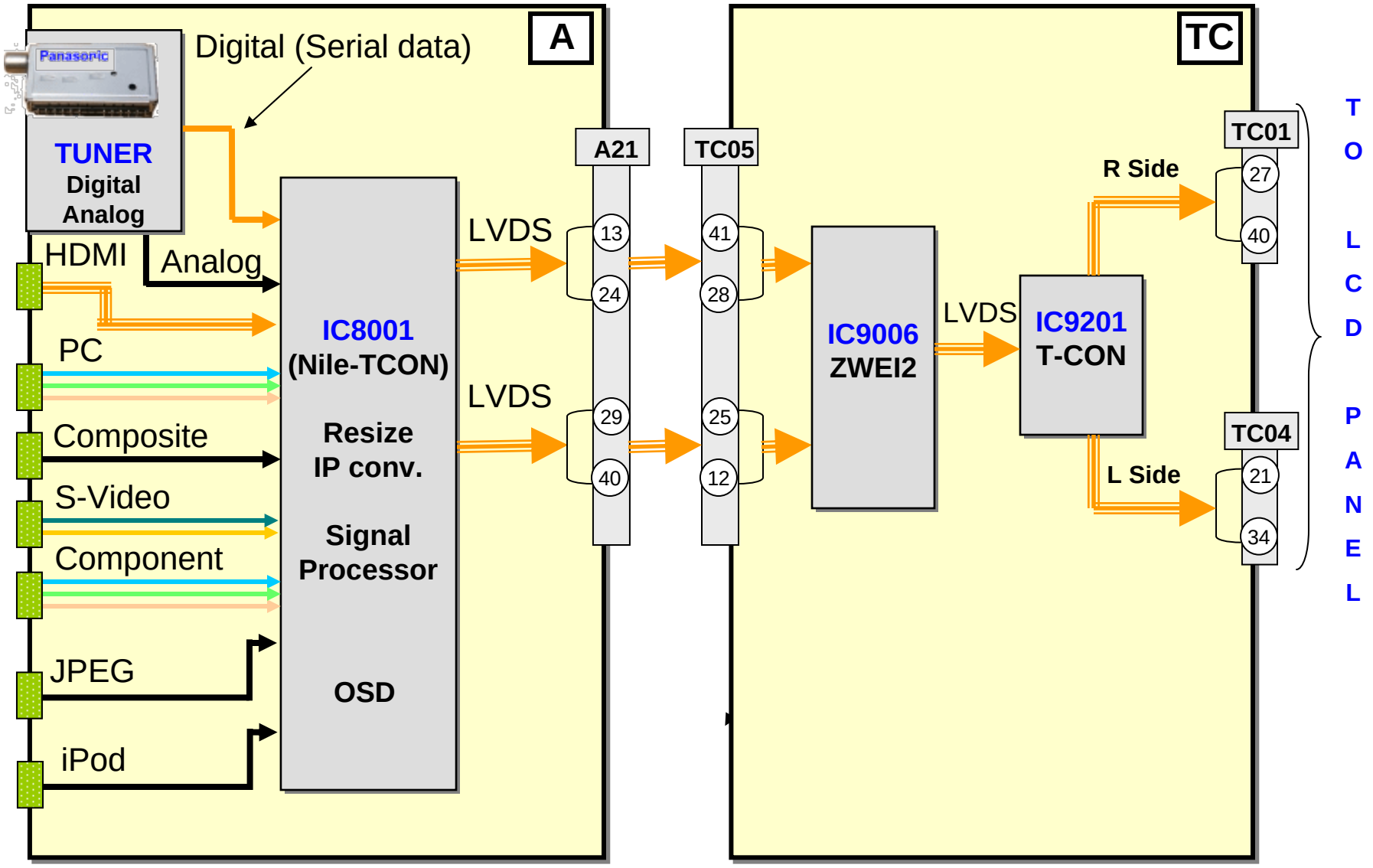
The main function of the A board is to select and process one of the incoming video signals. Video inputs 1 and 2, Component Video Input, HDMI inputs 1, 2 and 3, JPEG data from the SD card slot, and the composite video output of the tuner are all connected to IC8001 for selection. The video input signal can be in any of the three formats: Video, Y/C, YPbPr .
All analog signals that enter IC8001 undergo digital to analog conversion. When the signal source signal is composite, a comb filter separates the video signal into Y and C (luminance and chrominance) signals. S-Video, which is already Y/C separated, simply passes through the comb filter. The signal is then converted to RGB data.
At the completion of this process, the format of the composite or S-Video signal is now the same as a digital 480i component signal. If the incoming video is in the 480p, 720P, 1080i, and 1080p format, the Y, Pb, and Pr signals undergo A/D (analog to digital) conversion only.

Digital television reception of the tuner is output in the form of an IF (Intermediate Frequency) signal .
The transport stream from the tuner enters the VSB I/F (Interface) section of IC8001 where the video signal is extracted and converted to RGB data. The output is provided to the Video Input I/F for selection. The JPEG data of the SD card enters the JPEG I/F section of IC8001 for conversion into RGB data and output to the Video Input I/F circuit. The video input interface outputs the selected picture data to the video process circuit.

The Video Process section of the IC performs all picture control operations such as brightness, contrast, color, tint, etc. On Screen Display data such as channel numbers, Digital TV closed caption, and picture adjustments are mixed with the video data. The RGB data is then converted to dual 14 bit LVDS (Low Voltage Differential Signaling) and output to the LCD panel.

IC8001 handles all video applications. It serves as the controller that monitors all operations of the TV section of the unit.

D Series Video Signal Process Circuit



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D Series Video Signal Process Circuit

The main function of the A board is to select and process one of the incoming video signals. Video inputs 1 and 2, Component Video Input, HDMI inputs 1, 2 and 3, JPEG data from the SD card slot, and the composite video output of the tuner are all connected to IC8001 for selection. The video input signal can be in any of the three formats: Video, Y/C, YPbPr .
All analog signals that enter IC8001 undergo analog to digital conversion. Digital television reception of the tuner is output in the form of an IF (Intermediate Frequency) signal. The transport stream from the tuner enters the VSB I/F (Interface) section of IC8001 where the video signal is extracted and converted to RGB data. The output is provided to the Video Input I/F for selection. The JPEG data of the SD card enters the JPEG I/F section of IC8001 for conversion into RGB data and output to the Video Input I/F circuit. The video input interface outputs the selected picture data to the video process circuit.

The Video Process section of the IC performs all picture control operations such as brightness, contrast, color, tint, etc. On Screen Display data such as channel numbers, Digital TV closed caption, and picture adjustments are mixed with the video data. The RGB data is then converted to dual 14 bit LVDS (Low Voltage Differential Signaling) and output to the LCD panel. IC8001 handles all video applications. It serves as the controller that monitors all operations of the TV section of the unit.

The T-Con Board receives from the A Board at connector A21/TC05 two 14 Bit LVDS Signals. The serialized data (LVDS) is then converted to parallel by the ZWEI2 IC. The data is then processed by the timing control IC (TCON) to convert the RGB data into serial streams (TFT Drive signals) to control the operation of the LCD panel. The signals enter the LCD panel through connectors TC01 and TC04.
The drivers are mounted on circuit boards to the top and side of the panel. Shift registers and drivers provide the drive signals to the rows and columns of pixels on the panel. 12V is supplied to the T-Con Board on connector A21/TC05 from the Main Board.
The TCON IC produces the data that drives the LCD panel.

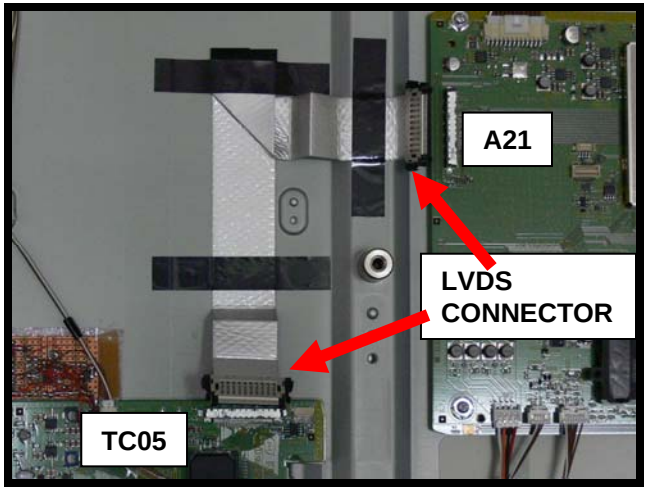
Troubleshooting TCON Problems

Video Process (A-Board) defect:

Video signals received by the video process circuits are handled on a frame-by-frame basis. It is almost impossible for the video process circuits to cause a symptom on a specific area of the screen. Failures on the video process board usually presents themselves as distortions, color level shifts, video level shifts or noise that affects the entire picture. The TCON can develop symptoms that seem to be video process related but the video process circuits will not provide symptoms that would be mistaken for a failed TCON circuit.

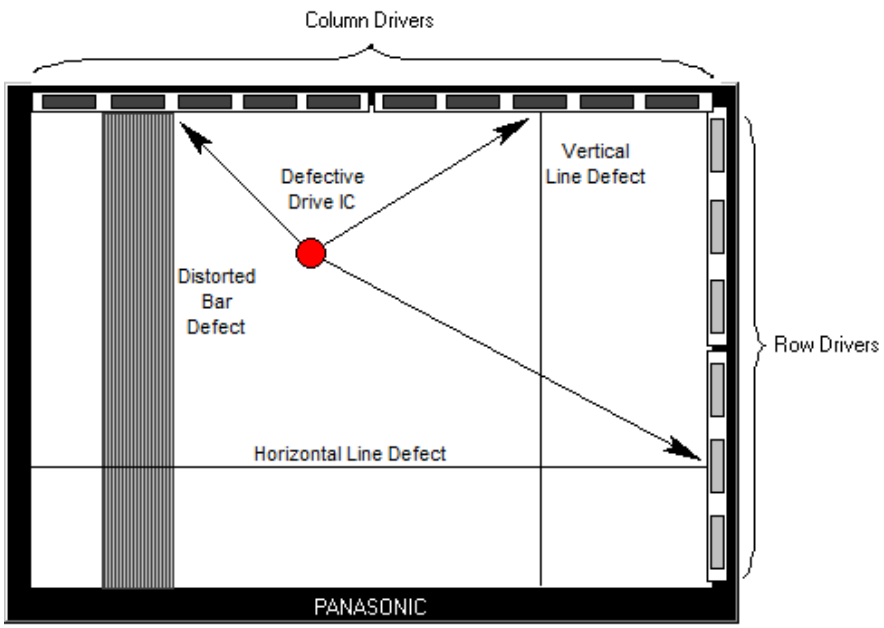
LVDS cable defect

Although problems with the LVDS cable or connectors can cause symptoms that resemble TCON failures, they usually tends to be intermittent and wiggling of the connectors will likely cause a change in the symptom on the screen.

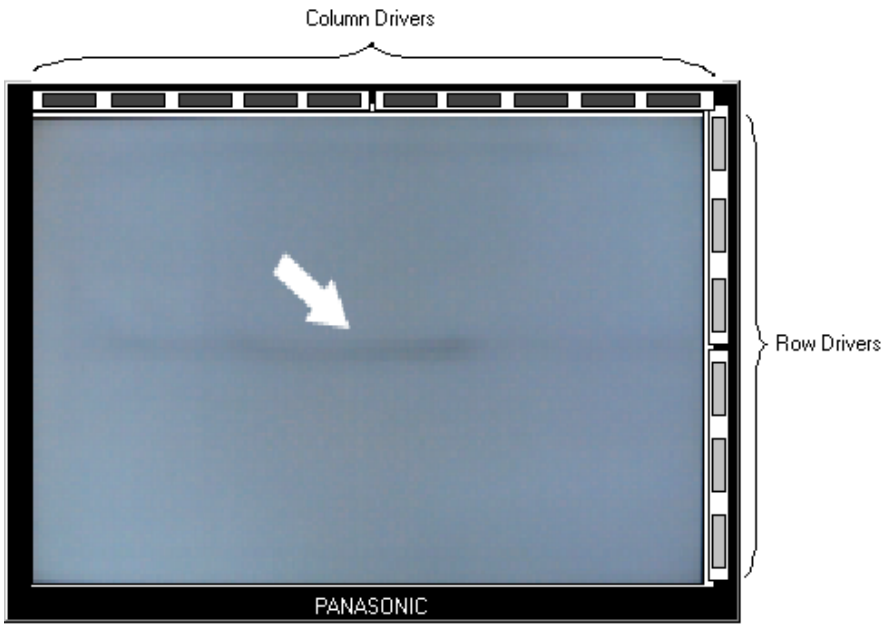


Troubleshooting TCON Problems

LCD Panel defect



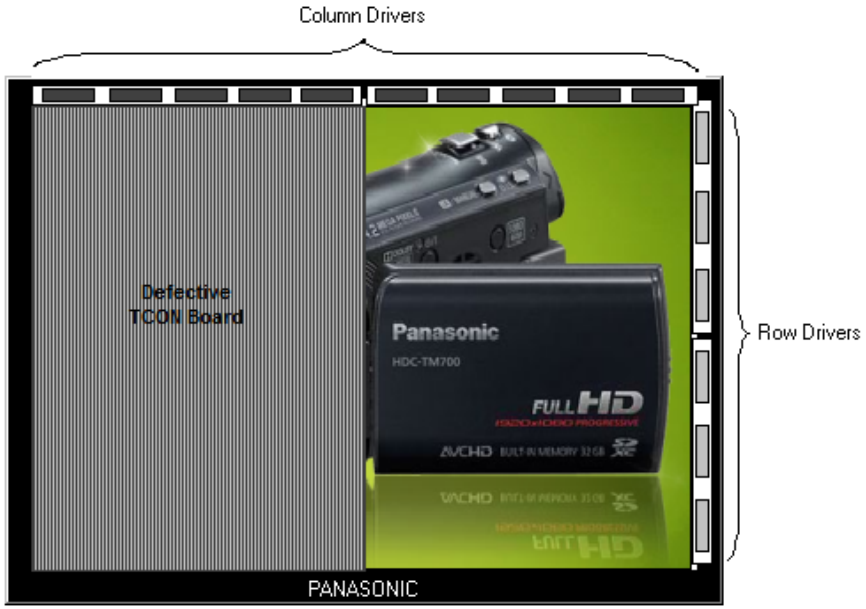
LCD PANEL FAILURES



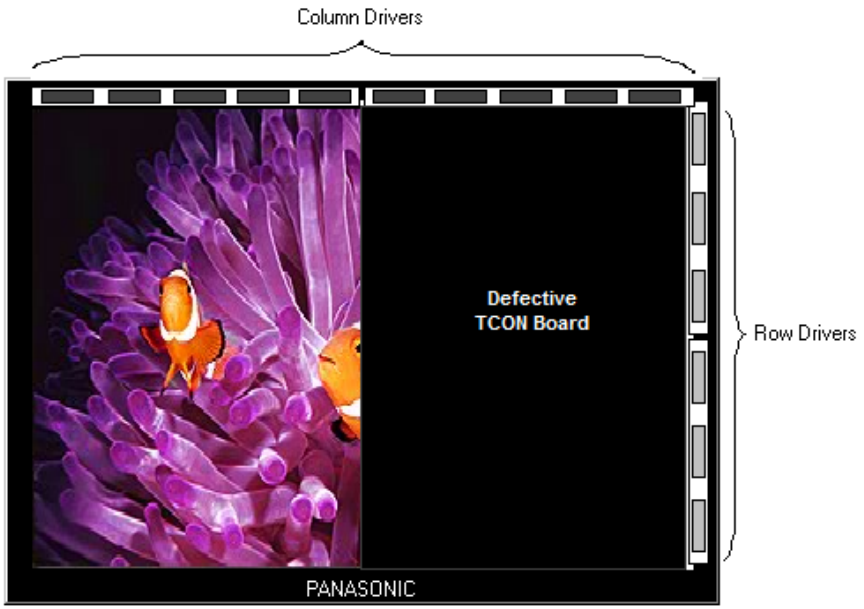
LCD PANEL FAILURE

At times, symptoms of a defective panel may be mistakenly identified as a TCON failure. Beside a broken LCD glass, most panel symptom would appear in a particular section of the screen. The TCON provides pixel data to groups of row and column drive ICs located on the upper and side edges of the panel. It is improbable that several of these ICs would fail at the same time. Therefore many columns or rows of pixels that are on or off point to a defective TCON. A single row of On or Off pixels cannot be attributed to the TCON. The TCON simply cannot cut out a single line of information.

Troubleshooting TCON Problems Continued



TCON FAILURE

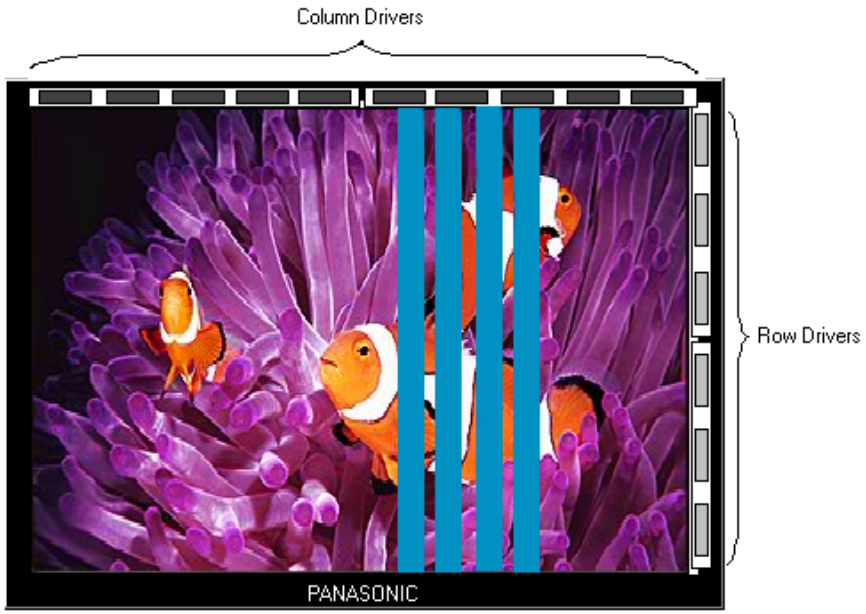


TCON FAILURE

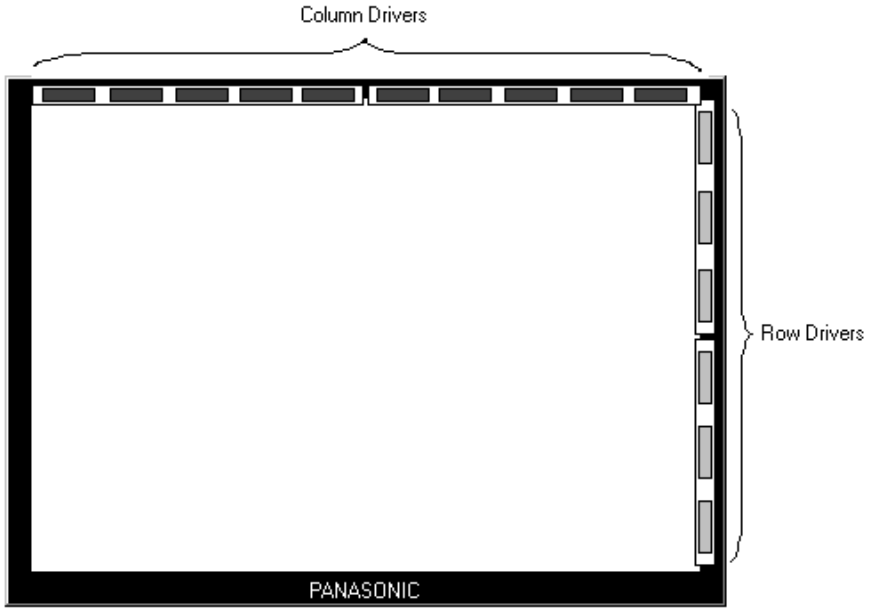
TCON defect

A failed TCON circuit can produce a symptom of no video or lines and patterns that usually occupy a sizeable portion of the screen. A “no video” condition caused by the TCON is a bit harder to determine since there are no indications on the screen to analyze.

Troubleshooting TCON Problems Continued



TCON FAILURE



TCON FAILURE

TCON defect

A failed TCON circuit can produce a symptom of no video or lines and patterns that usually occupy a sizeable portion of the screen. A “no video” condition caused by the TCON is a bit harder to determine since there are no indications on the screen to analyze.

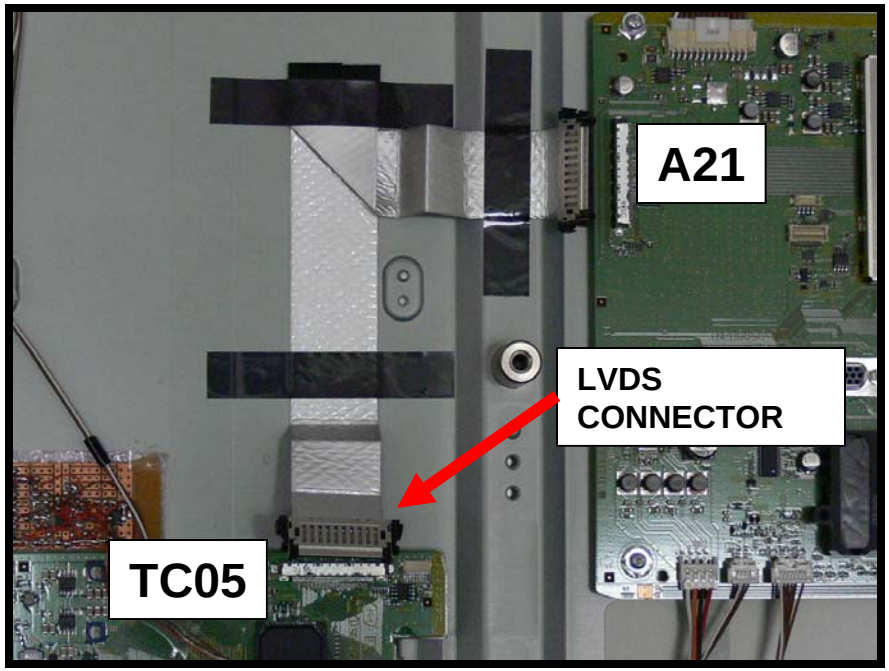
Troubleshooting TCON Problems Continued

Troubleshooting a dead TCON board

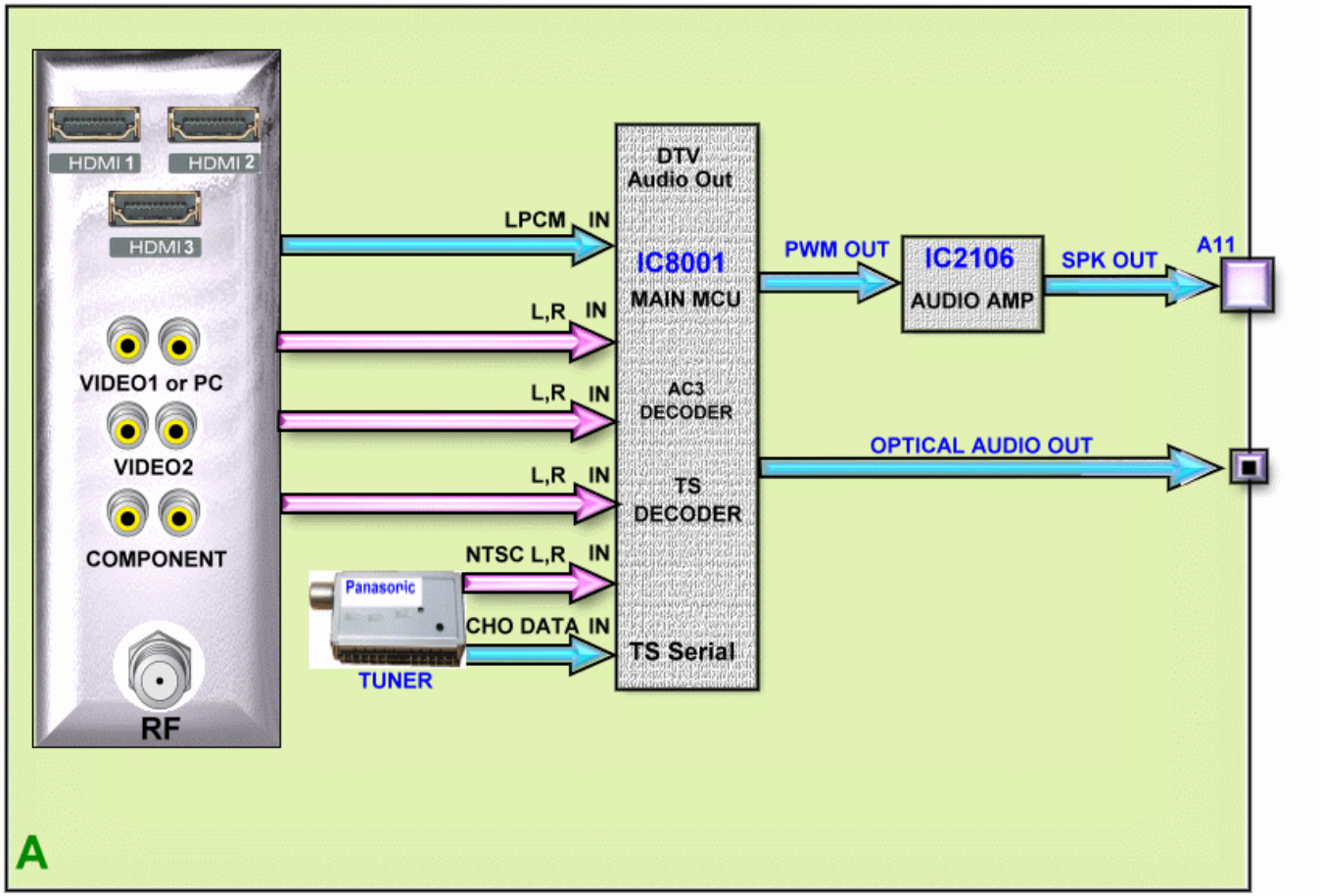
When the TCON board completely fails, data communication data between IC8001 and the TCON IC will come to an end. The television will shut down and the power LED will blink 9 times, indicating the failure of the TCON.
When there is no error code, the usual approach is for the technician to replace the A-board. Once it is determined that the A board is not the fix, one can conclude with a degree of certainty that the problem is the TCON board.

Avoiding wrong board replacement

One way to determine the location of the fault is to loosen the LVDS connector at the TCON board while the unit is turned on. Unlock the connector and gently rock the cable in and out of the socket while observing the screen for any sign of noise. The response may be gentle white flashes, intermittent colored lines, or a screen full of random patterns. A TCON board that has completely failed will not generate any type of symptom on the screen.
Another method to rapidly diagnose the TCON is to apply heat and/or cool with hot air devices or circuit coolant and watch for random noise to appear on the screen.



Audio Process Circuit



All the audio signals' selection and processing are performed by the Main CPU/Signal Processor IC (IC8001). The digital audio signal from IC8001 is output to the optical audio output jack as PCM/Dolby Digital.

Serial data is output to the audio amplifier IC (IC2106). The output of IC2106 is connected to the speakers.

SOS Detect (Shutdown)

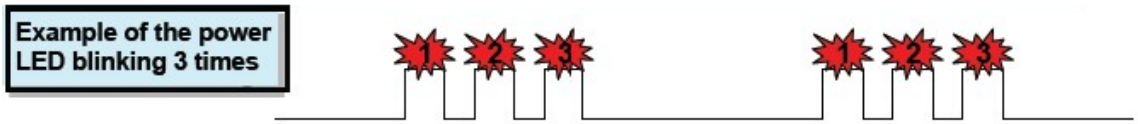
Panasonic ideas for life

TC-L37U22 Power LED Diagnostic Codes

When an abnormality is detected, the protection circuit resets the unit to the standby mode. The (A) board microprocessor causes the power LED to blink a number of times. The number of blinks points to the board where the abnormality is detected.

Blinking times	Contents	BOARD
1	BACK LIGHT_SOS	P BOARD LCD Panel
3	PANEL POWER_SOS	A BOARD
4	DTV12V_SOS	P/A BOARD
7	SUB 3.3V_SENSE	A BOARD
9	SOUND SOS	A BOARD
13	EMERGENCY_SOS	A BOARD

Protection circuits are incorporated in the unit to prevent the failure of a single circuit or component from creating catastrophic damage. A shutdown condition occurs when a there is an over voltage, a short or a drop in any of the voltage lines.

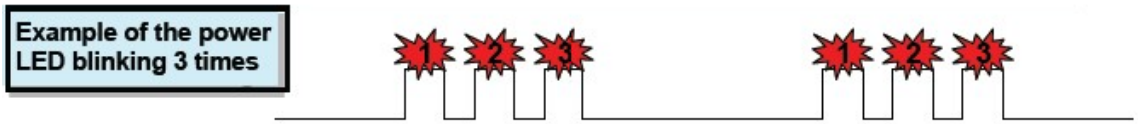


TC-L42D2 Power LED Diagnostic Codes

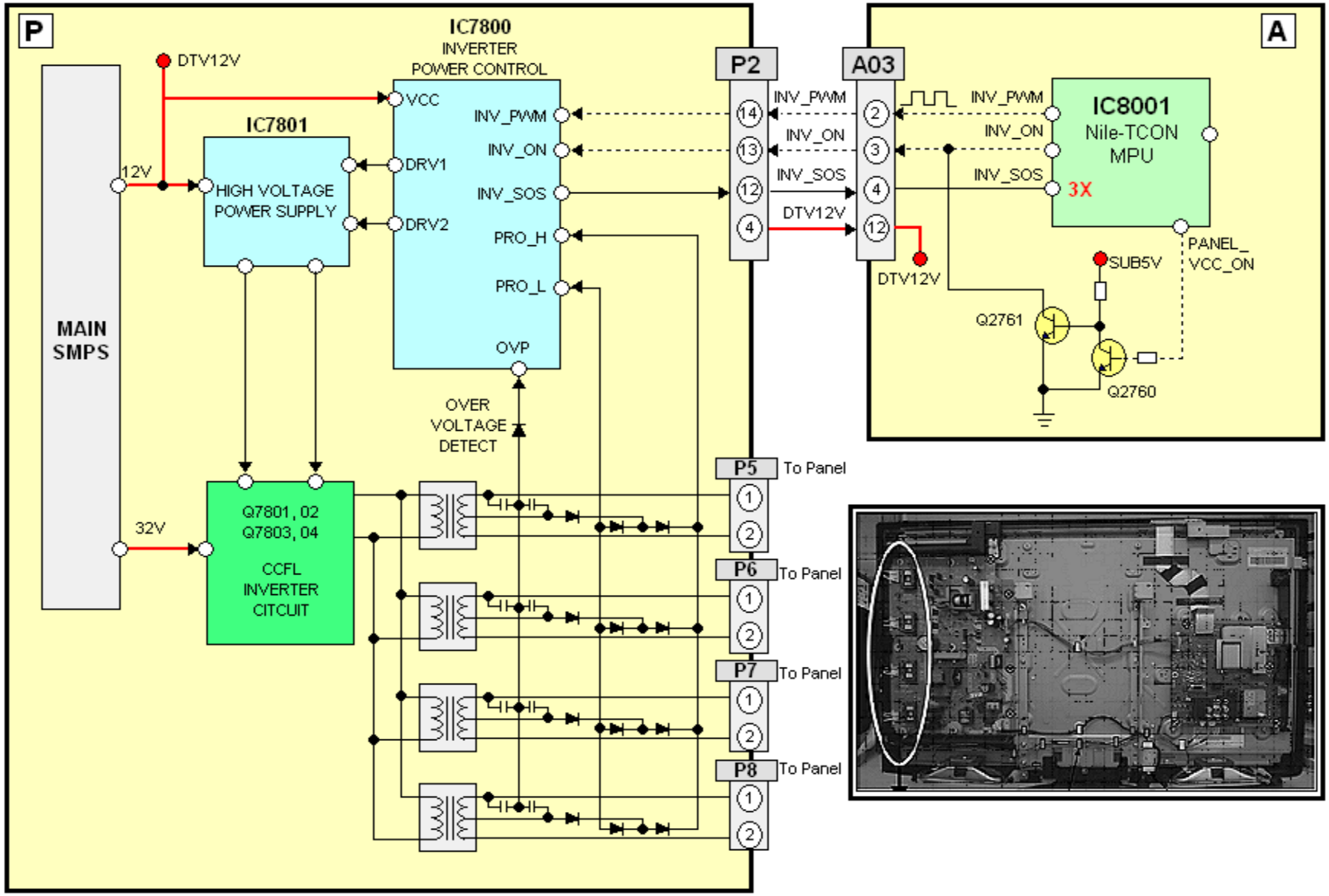
When an abnormality is detected, the protection circuit resets the unit to the standby mode. The (A) board microprocessor causes the power LED to blink a number of times. The number of blinks points to the board where the abnormality is detected.

Blinking times	Contents	BOARD
1	BACK LIGHT_SOS	P BOARD LCD Panel
3	PANEL POWER_SOS	A BOARD
4	DTV12V_SOS	P/A BOARD
7	SUB 3.3V_SENSE	A BOARD
9	SOUND SOS	A BOARD
10	ZWEI2 SOS	TC BOARD
13	EMERGENCY_SOS	A BOARD

Protection circuits are incorporated in the unit to prevent the failure of a single circuit or component from creating catastrophic damage. A shutdown condition occurs when a there is an over voltage, a short or a drop in any of the voltage lines.



TC-L32U22_1 Blink SOS Circuit



Panasonic ideas for life

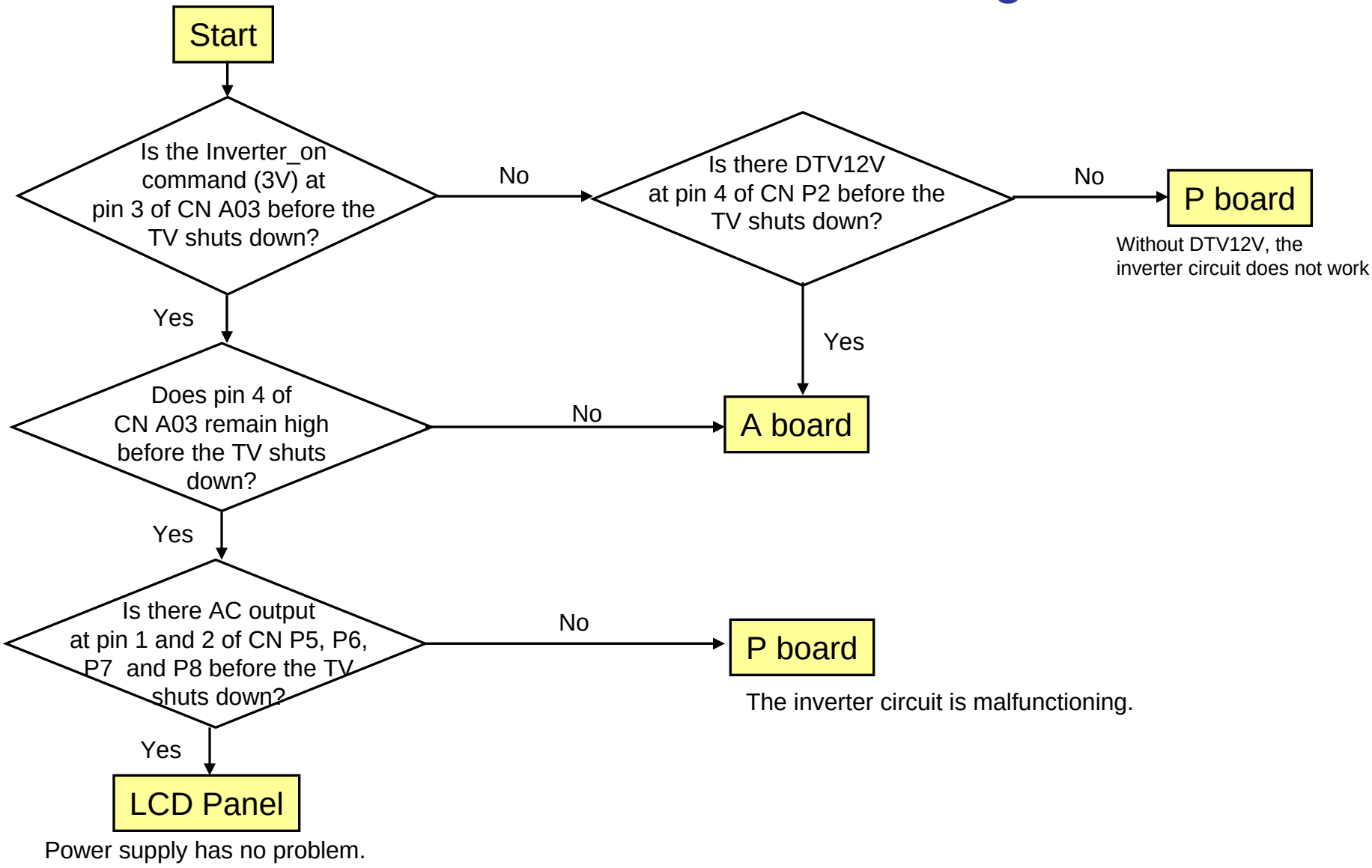
1 Blink SOS Circuit

When the power button is pushed , IC8001 outputs the TVSUB ON command to turn on the main power supply and output the power_on voltages. Upon confirmation of the output voltages of the power supply, IC8001 sends the Inverter_ON command to P board.

On the power supply board, the Inverter_On command enters IC7800, the inverter control IC. IC7800 then outputs the trigger that turns on the oscillator IC7801. The sine wave output of the oscillator is provided to the switching transistors connected to T7801 to generate a magnetic field. The AC output at the secondary of T7801 is provided to the LCD panel via the connectors P5, P6, P7 and P8 to power the backlights.

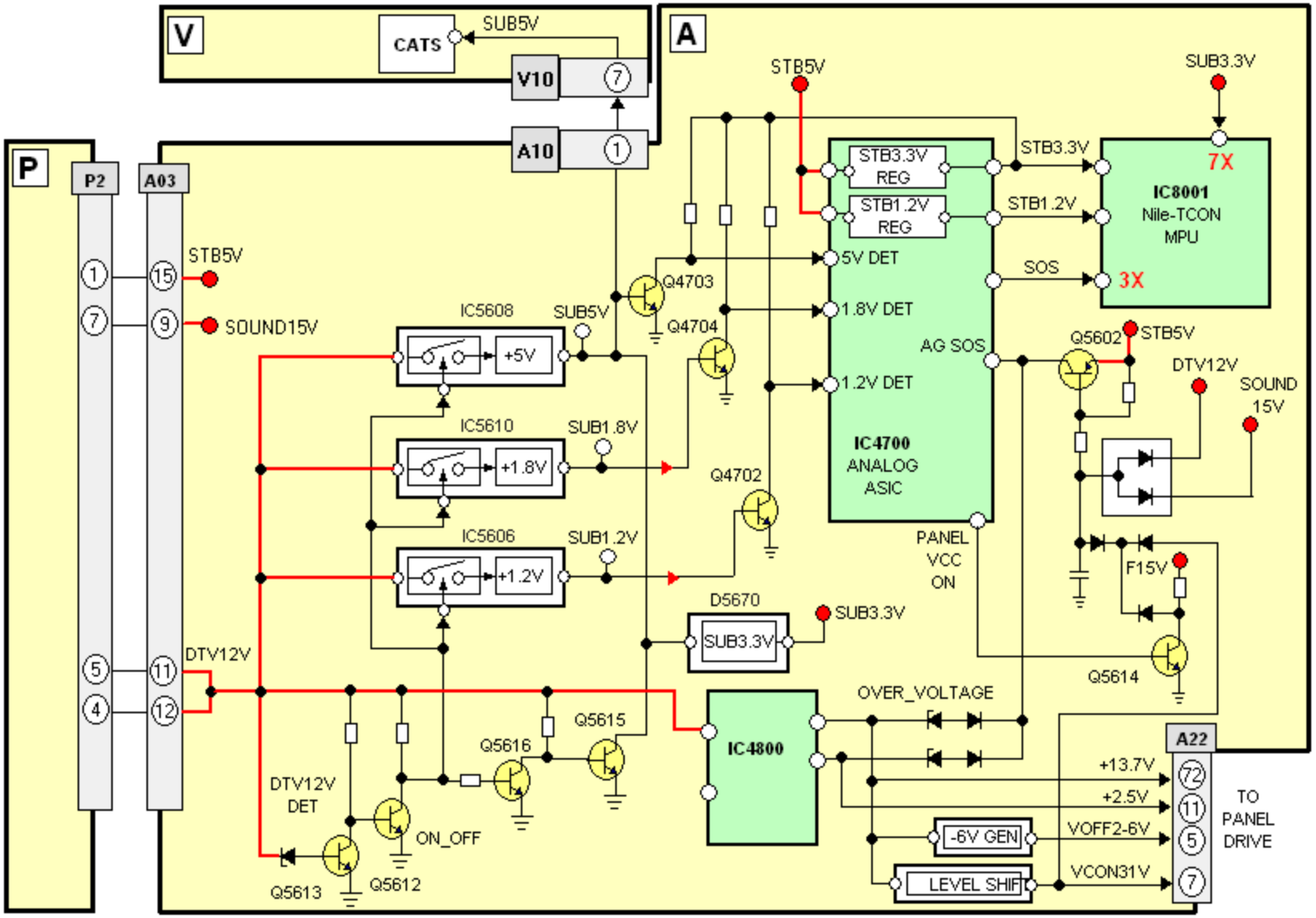
When the inverter is operating properly, the inverter SOS input of the micro is pulled low.
If a malfunction occurs, a detection circuit located within IC7800 sends out a SOS command to alert the inverter control IC, IC7800. IC7800 conveys the SOS message to the main micro IC8001 by keeping the inverter SOS input high. The TV shuts down and the power LED blinks 1 time.

1 Blink SOS Troubleshooting



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3 and 7 Blinks SOS Circuit



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3 and 7 Blinks SOS Circuit

The A Board is responsible for the regulation, distribution and dissemination of all secondary voltages derived from the DTV12V output of the P Board. When the unit is powered, the 12V output of the P board biases the transistor Q5613 into operation, causing its collector to become “low”. As a result the transistors Q5612 turns off. The high at the collector of Q5612 causes IC5606, IC5608, IC5610, and D5670 to operate and provide the SUB5V, 1.8V, 1.2V, and SUB3.3V output.

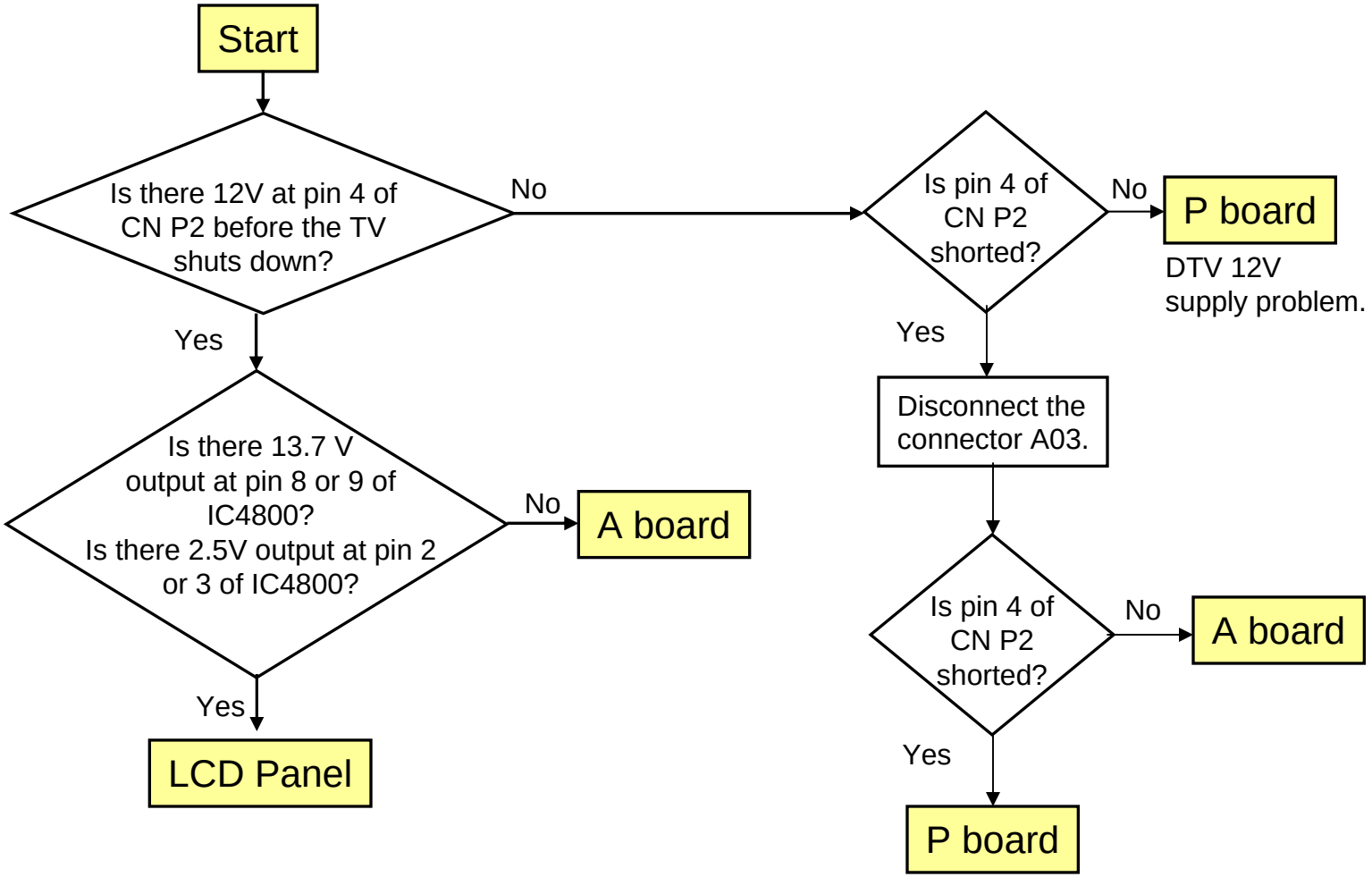
If a malfunction occurs and the SUB5V, 1.8V, and 1.2V are not present, IC4700 detects the loss of voltage and provides an output to IC8001 to shut the unit down. The power LED blinks 3 times.

The SUB3.3V is monitored directly by the CPU, IC8001. If it is shorted or missing, the unit shuts down and the power LED blinks 7 times.

IC8001 turns off the AC power by disabling the SUB_ON command that turns on the AC relay.

3 Blinks SOS Circuit Troubleshooting

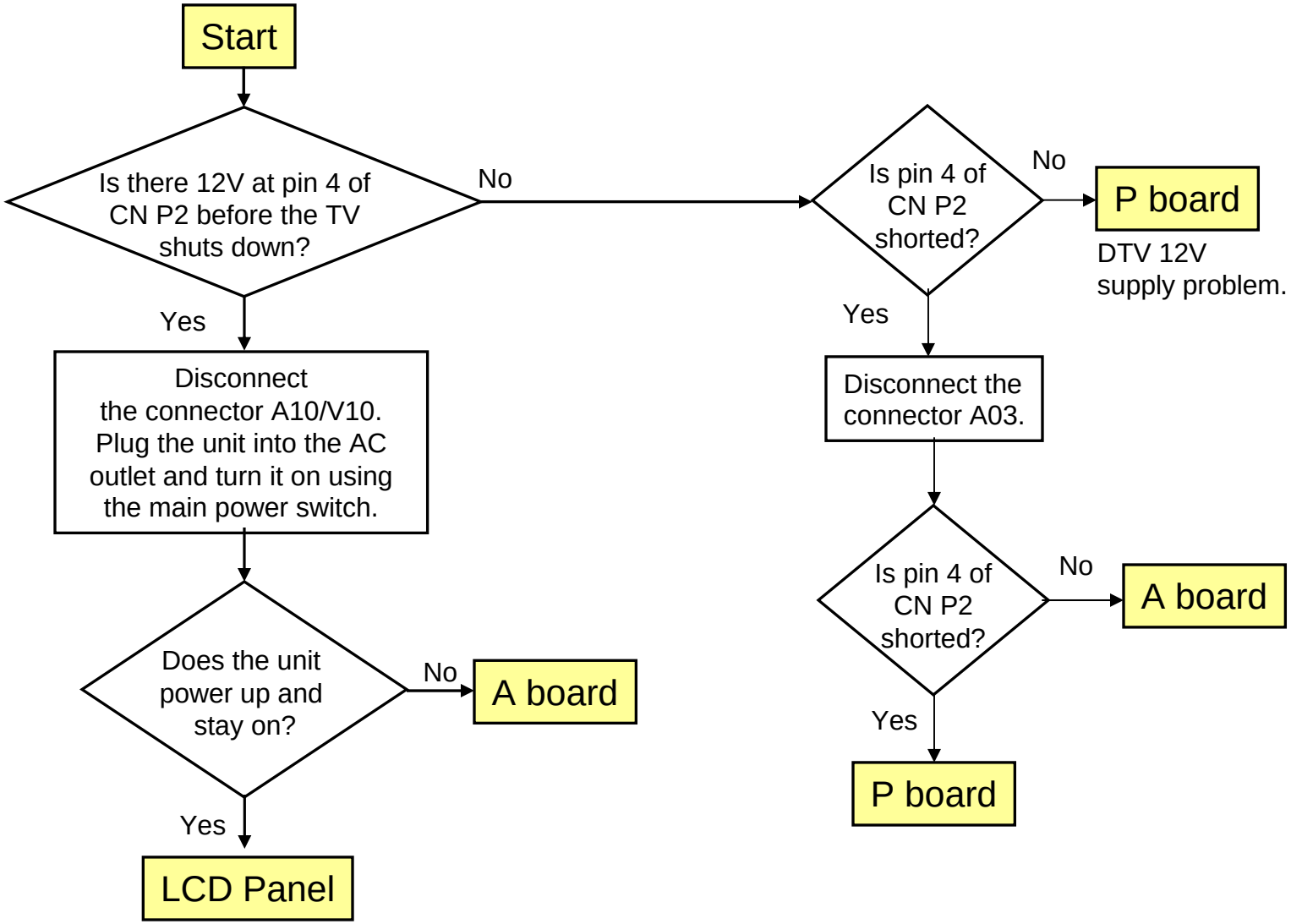
The 13.7V and 2.5V are converted from the DTV12V source on the A board.
They are then supplied to the LCD panel to power the drive circuit.



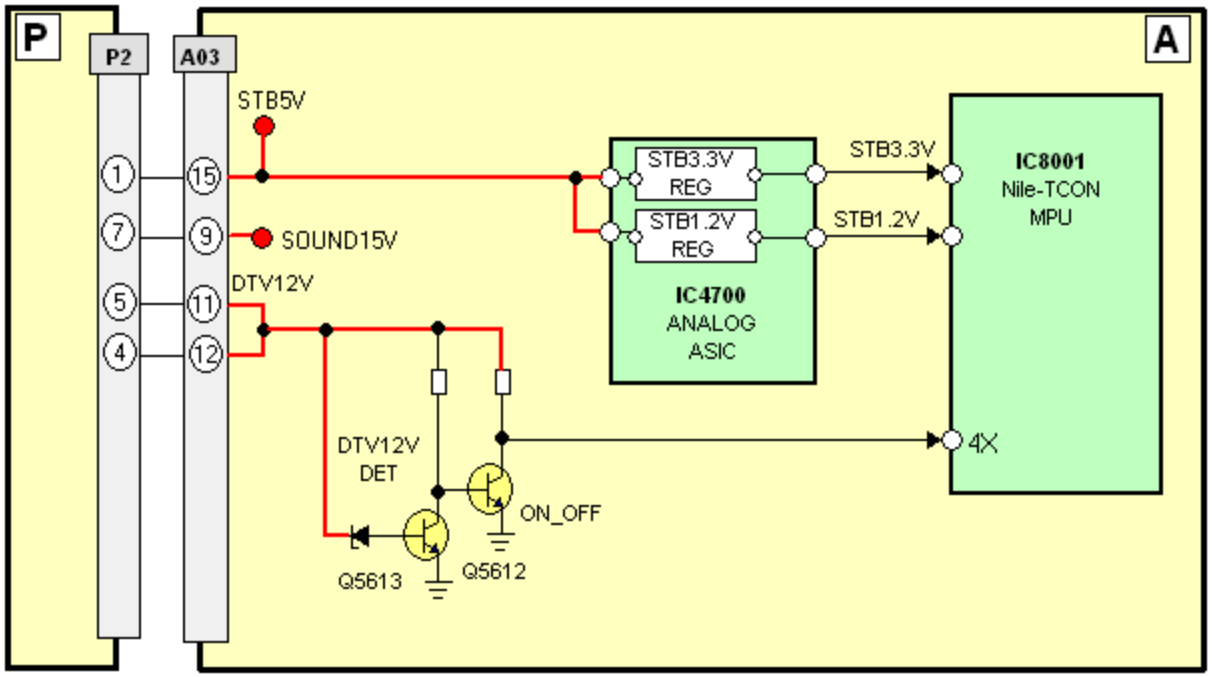
Panasonic ideas for life

7 Blinks SOS Circuit

The 17V and SUB3.3V sources are used to power the audio amplifier, IC2106.
If IC2106 becomes defective, either the 17V or 3.3V line will be affected. The 3.3V is directly monitored by IC8001.
In the event of a short, IC8001 shuts down the unit and the power LED blinks 7 times.



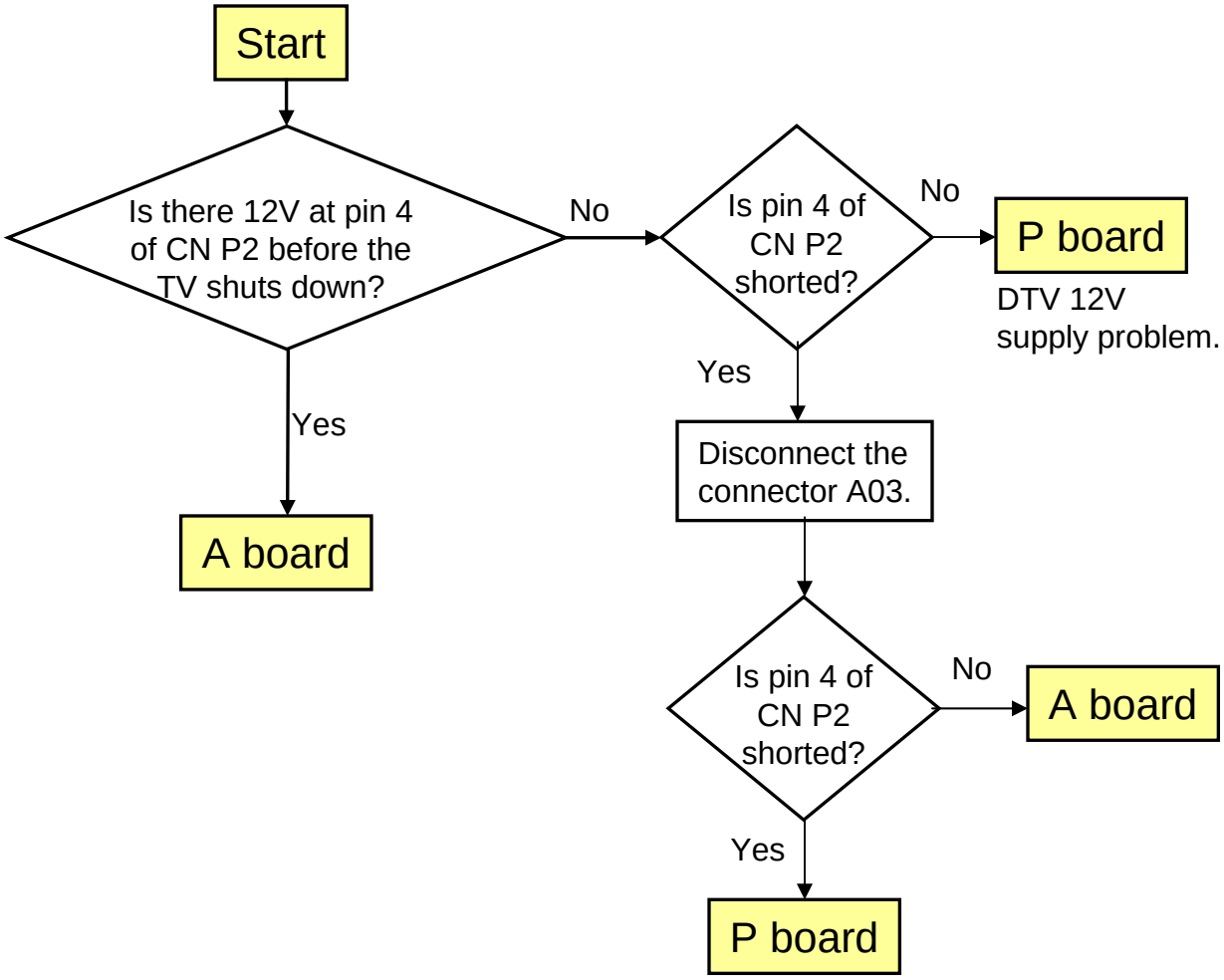
4 Blinks SOS Circuit



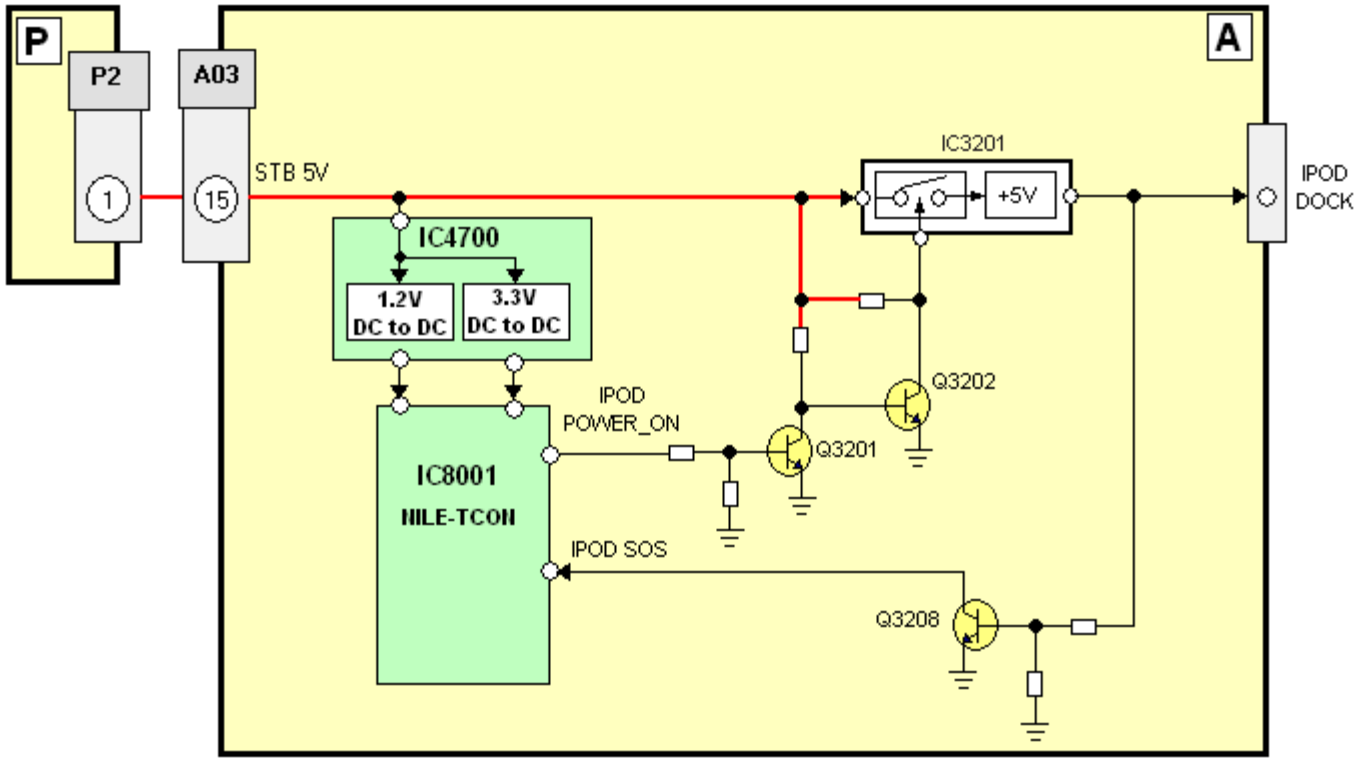
When the unit is turned on, the DTV source of the P board is provided to the A board for conversion into other voltages. A zener diode at the base of transistor Q5613 protects against over-current condition. When the DTV12V source drops to a predetermined level, the zener diode turns off causing Q5613 to turn off and Q5612 to turn on. The input to IC8001 goes low resulting in the shutdown of the unit and 4 blinks of the power LED.

Panasonic ideas for life

4 Blinks SOS Troubleshooting



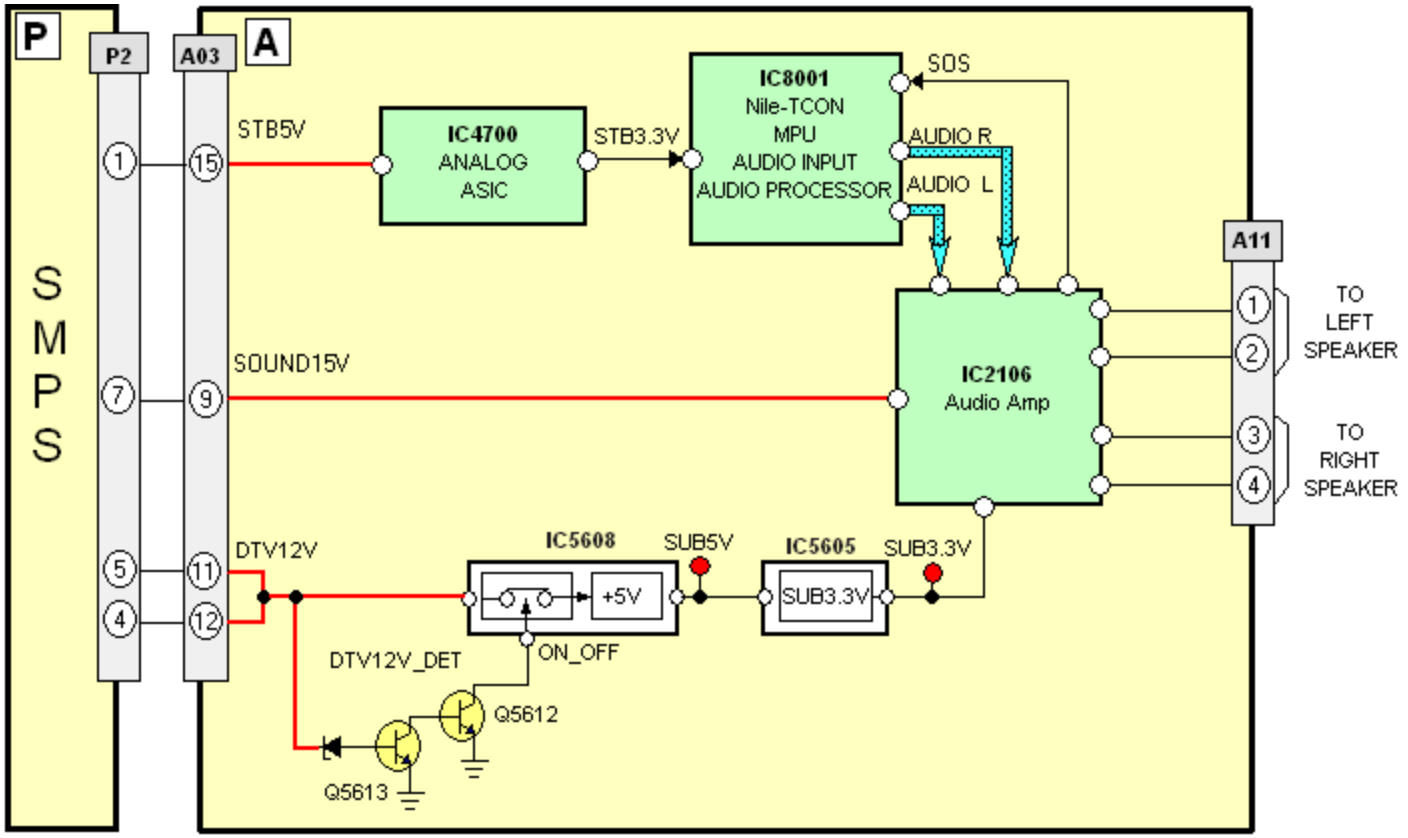
iPod SOS Circuit _ No Blink Code



The normal state of the iPod SOS input to IC8001 is low. This is achieved by applying the 5V output of IC3201 to the base of transistor Q3208. If the 5V source is missing or shorted, the transistor Q3208 turns off and its collector goes high to alert IC8001. The MPU within IC8001 turns off IC3201 and provides the “Check iPod Connection” warning on the screen. To restore normal operation:

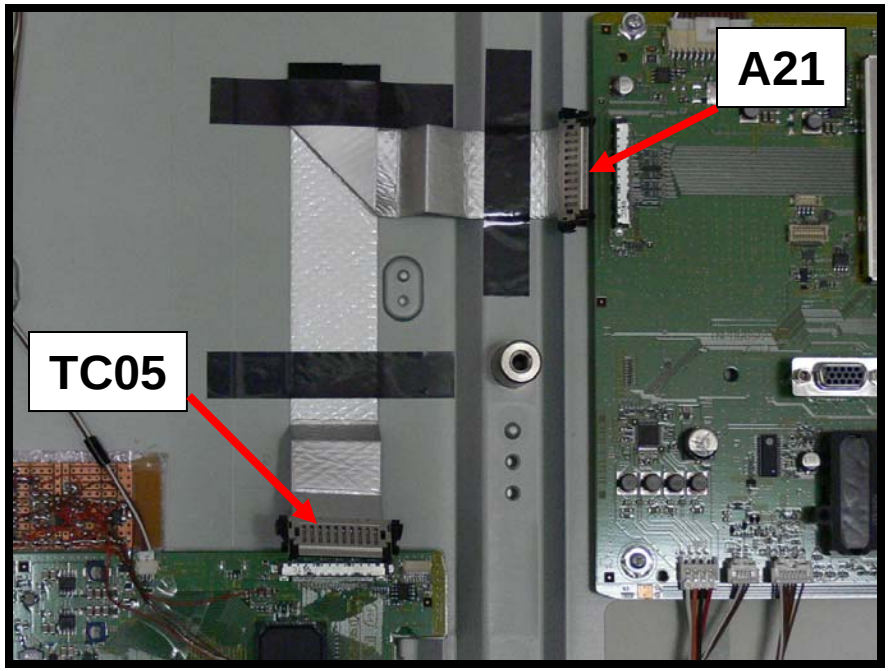
1. Turn off the TV
2. Unplug it from the AC outlet
3. Disconnect the iPod
4. Restore power to the unit _ Normal operation should be restored

9 Blinks SOS Circuit



On the A board, the MPU (IC8001) monitors the operation of the audio power amplifier IC2106. If IC2106 or one of the speakers develops a short circuit, a high is output to IC8001 to trigger a shutdown and 9 blinks of the power LED. When a 9 blinks shutdown occurs, disconnect the speakers one at a time and turn the unit on. If the problem remains, replace the A board. If it goes away, the disconnected speaker is the problem.

9 Blinks SOS Circuit

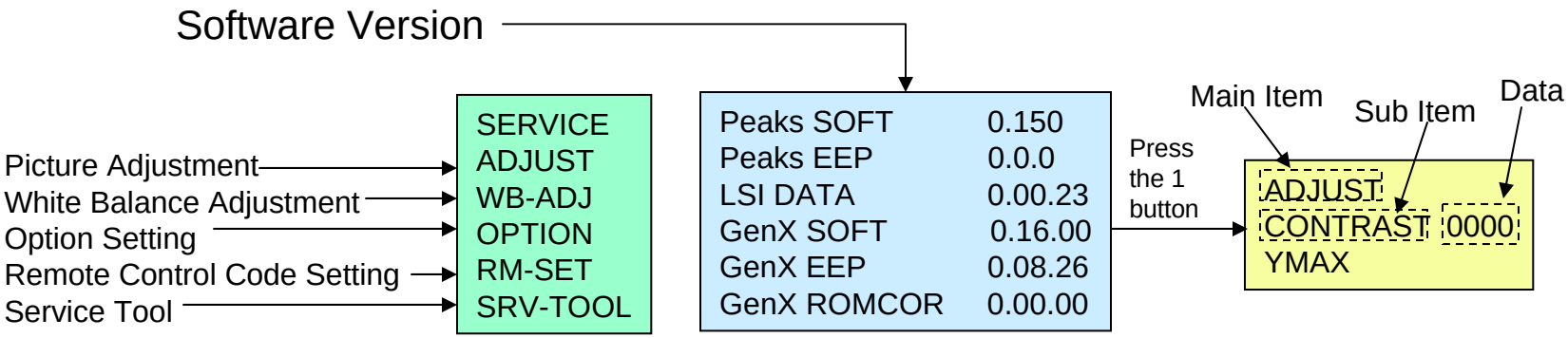


In the event the unit shuts down and the power LED blinks nine times, check for an improper connection of connector A21/TC05. The shutdown occurs due to no communication between the TC-Board and A-Board. A defective TCON board may also be the cause for the blink code.

Service Mode

How to enter the Service Mode

While pressing [VOLUME (-)] button of the main unit, press [INFO] button of the remote control three times within 2 seconds.



Key command

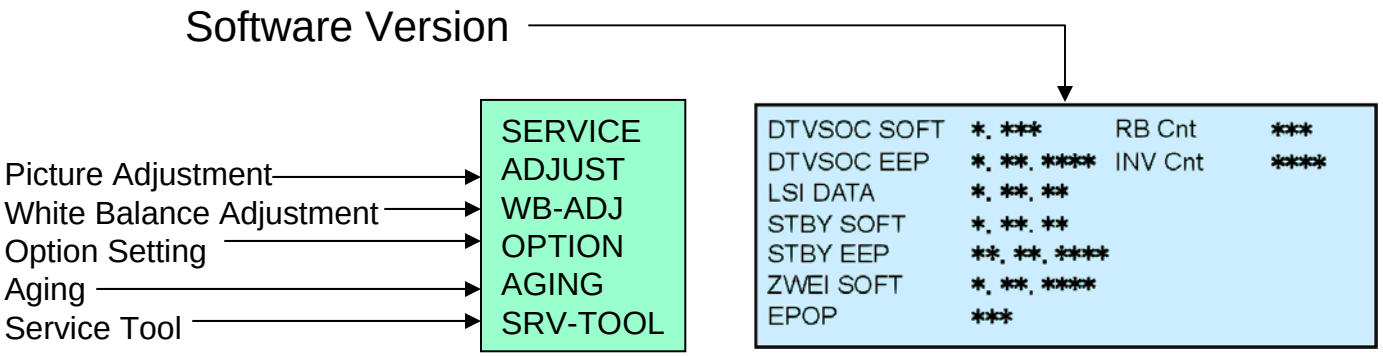
[1] button...Main items Selection in forward direction
[2] button...Main items Selection in reverse direction
[3] button...Sub items Selection in forward direction
[4] button...Sub items Selection in reverse direction
[VOL] button...Value of sub items change in forward direction (+), in reverse direction (-)

How to exit

Turn the television off with the [POWER] button on the main unit or the [POWER] button on the remote control.

Panasonic ideas for life

Service Mode Menu (D2 Series)



This aging mode only exists in the D2 series. It can be useful to determine the section of the unit that is responsible for a distorted picture

AGING	1. COUNT	2. ALL WHITE	3. ALL BLACK	4. ALL RED	5. ALL GREEN
	6. ALL_BLUE	7. RASTER1	8. RASTER2	9. RASTER3	10. RASTER4
	11. 4DIN1	12. 4DIN2	13. GRAY WHITE	14. GRAY RED	15. GRAY GREEN
	16. GRAY BLUE	17. FLICKER0	18. GS1	19. 1 PIX STRIPE	20. 2 PIX STRIPE
	21. 1 LINE_STRIPE	22. COLORBAR	23. WIDTH COLORBAR	24. OUTER	25. LIGHT CHECK
	26. FLICKER1	27. FLICKER2	28. FLICKER3		

D Series Measurements and Adjustments

VCOM Adjustment (Flicker Adjustment)

General information:

After replacing the LCD panel, TC board (T-CON) or both, the [VCOM] Adjustment has to be done.
Data for VCOM Adjustment is different depending on the LCD panel and the data stored in the TC board.
Adjustment procedures are as follows.

1. Enter the service mode

- While pressing the [VOLUME (-)] button of the main unit, press the [INFO] button of the remote control three times within 2 seconds.

2. Go into VCOM value indication

- Press the [1] button on the remote control to select [ADJUST].
- Press the [3] button on the remote control to select [VCOM]
- The adjustment value of [VCOM] is displayed.

3. Flicker Confirmation

- Press the [5] button on the remote control to display the flicker adjustment screen.
- Confirm if flicker can be seen.
- No flicker --- Exit from the Service mode.
- Flicker --- Adjustment has to be done.

4. VCOM Adjustment (Flicker Adjustment)

- This procedure writes into the EEPROM the correct data so the panel does not flicker.
- Press the remote control [+/ -] button to delete or minimize the flicker.
- Press the [OK] button to automatically write the data into the EEPROM (IC9206).

Caution:

- The data can be written into the EEPROM only 15 times. Don’t press the [OK] button many times.
- If the data cannot be written, replace the TC board or IC9206 with a new one.

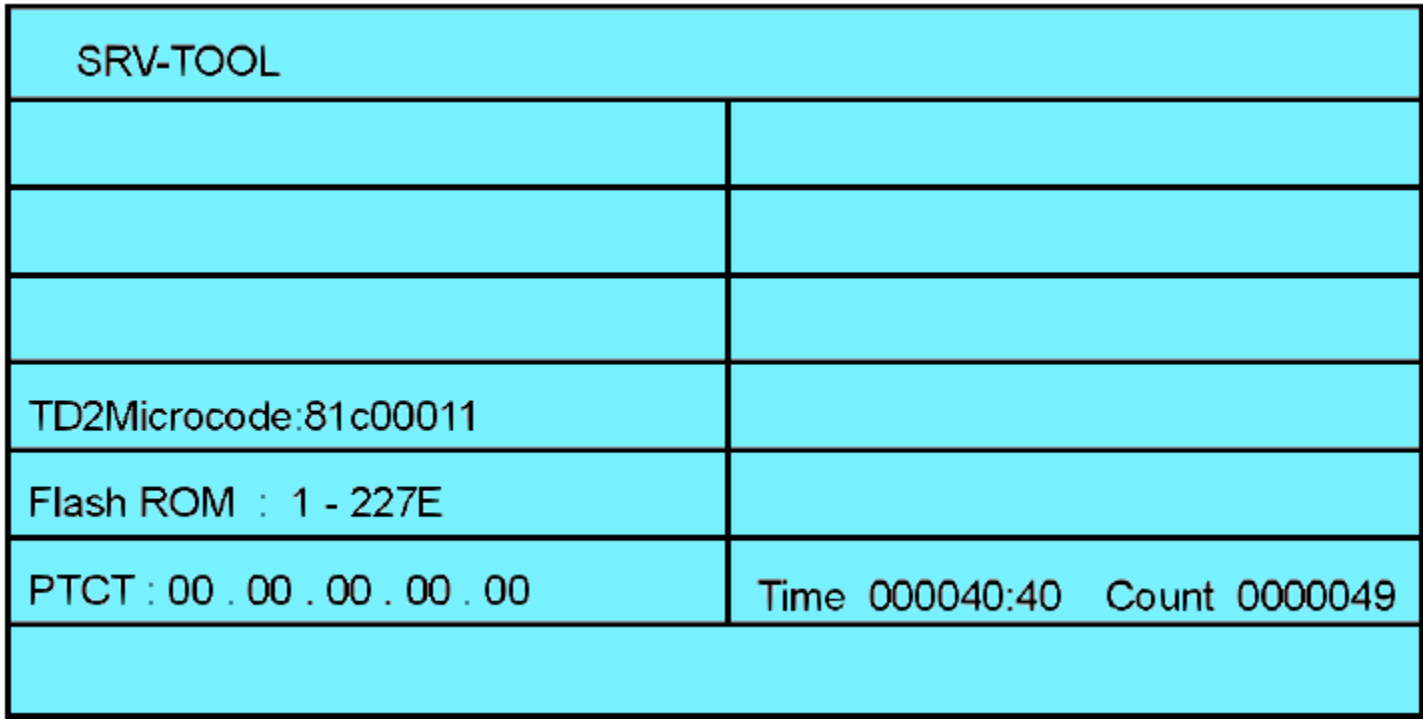
5. Exit from Service mode

Press the [POWER] button on the main unit or the [POWER] button on the remote control.

How to Enter the Service Mode_SRV-TOOL

How to access

1. Select [SRV-TOOL] in Service Mode.
2. Press [OK] button on the remote control.



Display of SOS (Shutdown) History

SOS History (Number of LED blinks) indication.
From the left side; Last SOS, before Last, two occurrences before last, 2nd occurrence after shipment, 1st occurrence after shipment.
This indication except the 2nd and 1st occurrence after shipment will be cleared by reset.

To exit

Disconnect the AC cord from the wall outlet.

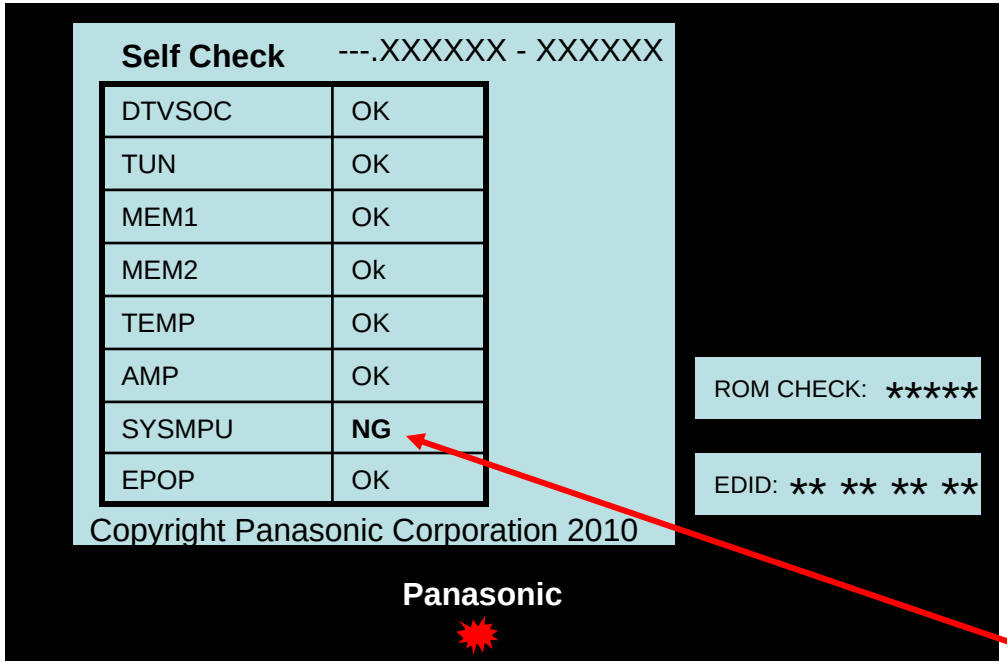
How to Enter the Self-check Mode

How to access:

1. Self-check display only:
While in TV reception mode, press the [VOLUME (-)] button on the main unit and simultaneously press the [OK] button on the remote control for 3 seconds or more.

2. Self-check display and forced to factory shipment setting:
While in TV reception mode, press the [VOLUME (-)] button on the main unit and simultaneously press the [MENU] button on the remote control for 3 seconds or more.

Self Check Screen



Self Check Description

Display	Ref. No.	Description	P.C.B.
DTVSOC	IC8001	Nile-TCON	A Board
TUN	IC8302	TUNER	A Board
MEM1	IC8004	EEPROM (MPU)	A Board
MEM2	IC8503	EEPROM (Nile)	A Board
TEMP	IC4701	TEMP SENSOR	A Board
AMP	IC2106	AUDIO AMP	A Board
SYSMPU	IC8001	SYSMPU (Nile-TCON	A Board

NG_ Indicates a defective part.

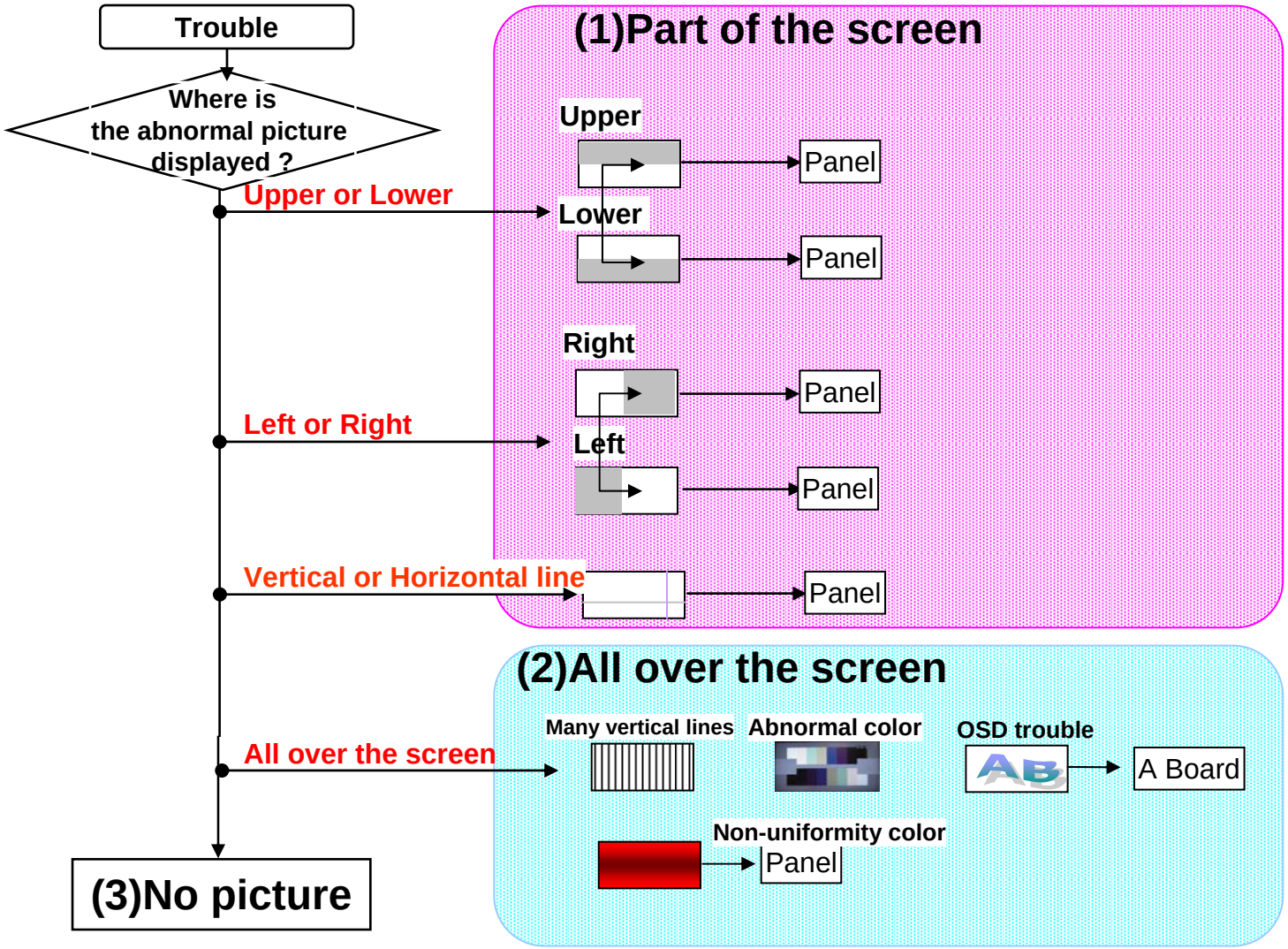
When NG is displayed, replace the (A) board.

How to Exit
Disconnect the AC cord from wall outlet.

Panasonic ideas for life

Troubleshooting Picture Problems (All Series except D)

Picture Defect (1)

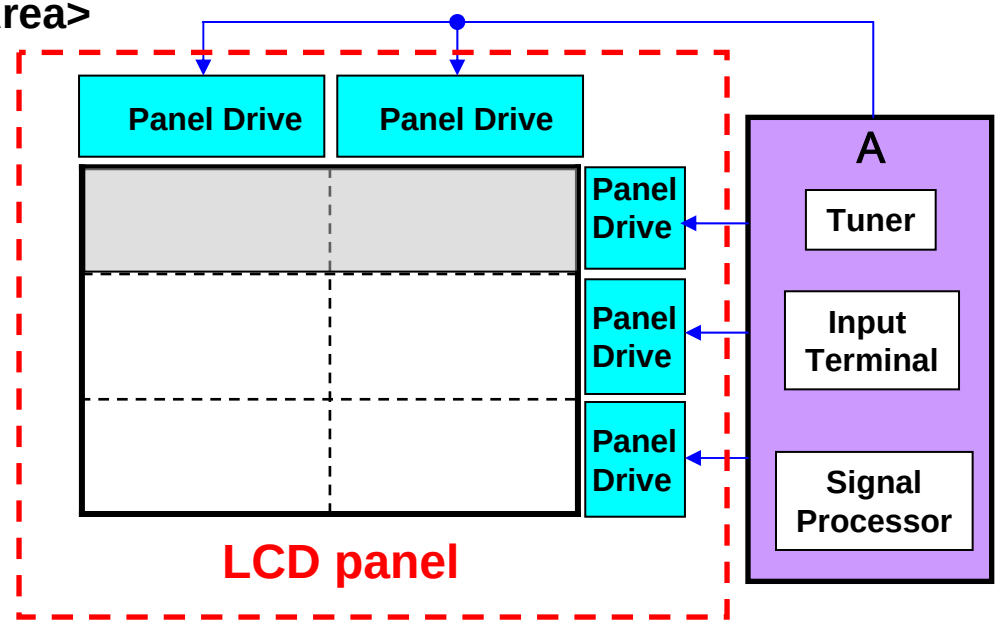


Picture Defect (2)

<Symptom>Upper or Lower Defect

Abnormality means
No Picture, Picture noise, abnormal picture,
Full Horizontal line etc.

<NG Area>



<Defective parts>

Panel (Panel drive)
Relation to panel drive location,
1/3 or 2/3 area will be troubled.

<Actual Symptom>

Symptom: Upper trouble

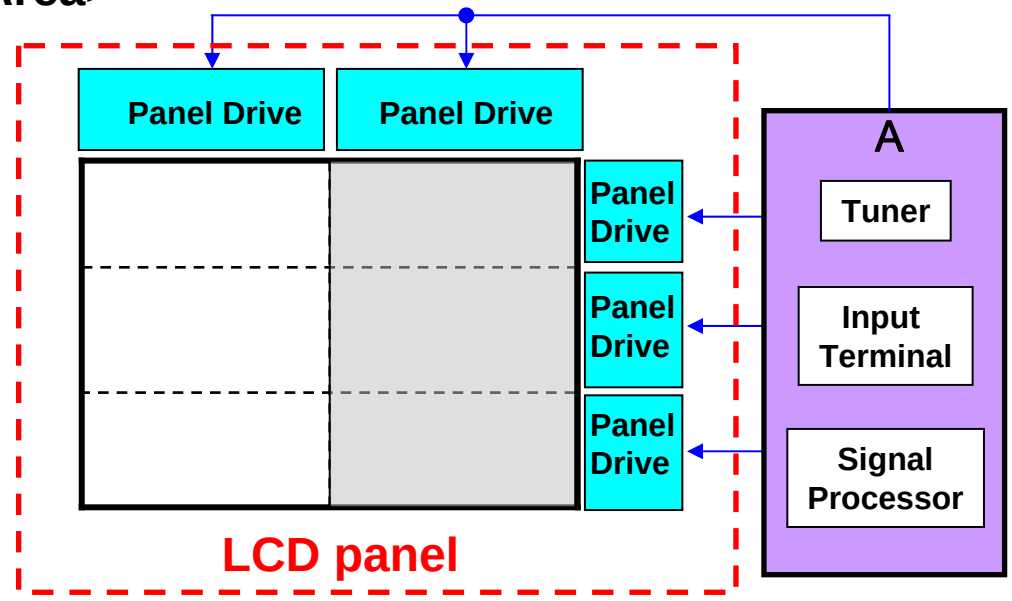


Picture Defect (3)

<Symptom>Left or Right half defect

No Picture, Picture noise, Full Horizontal line, etc.

<NG Area>



<Defective parts>

Panel (Panel drive) or A board

<Actual Symptom>

Symptom: Right half picture trouble

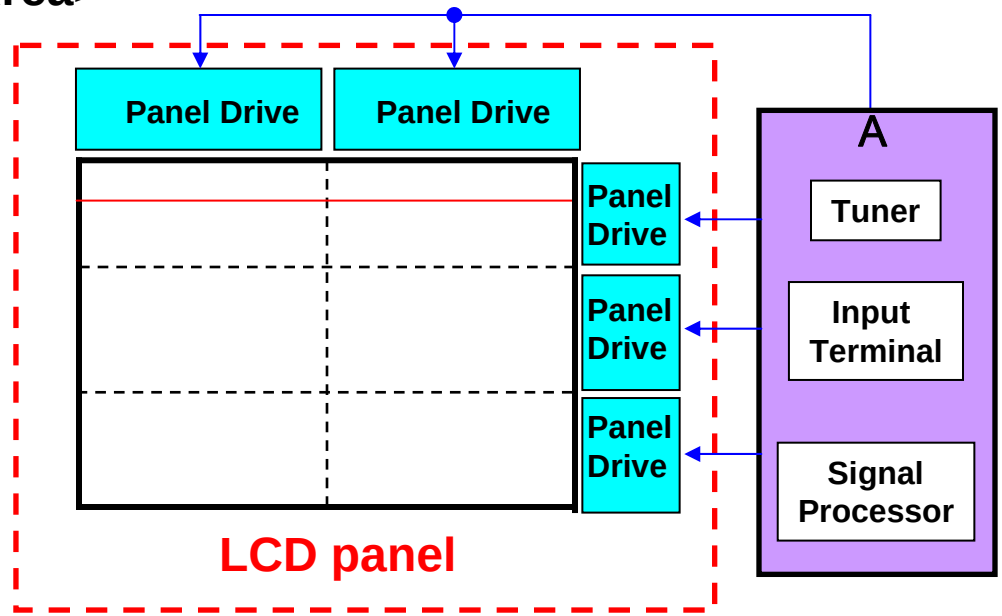


Panasonic ideas for life

Picture Defect (4)

<Symptom>Horizontal line

<NG Area>



<Defective parts>

Panel

<Actual Symptom>

Symptom: Horizontal line



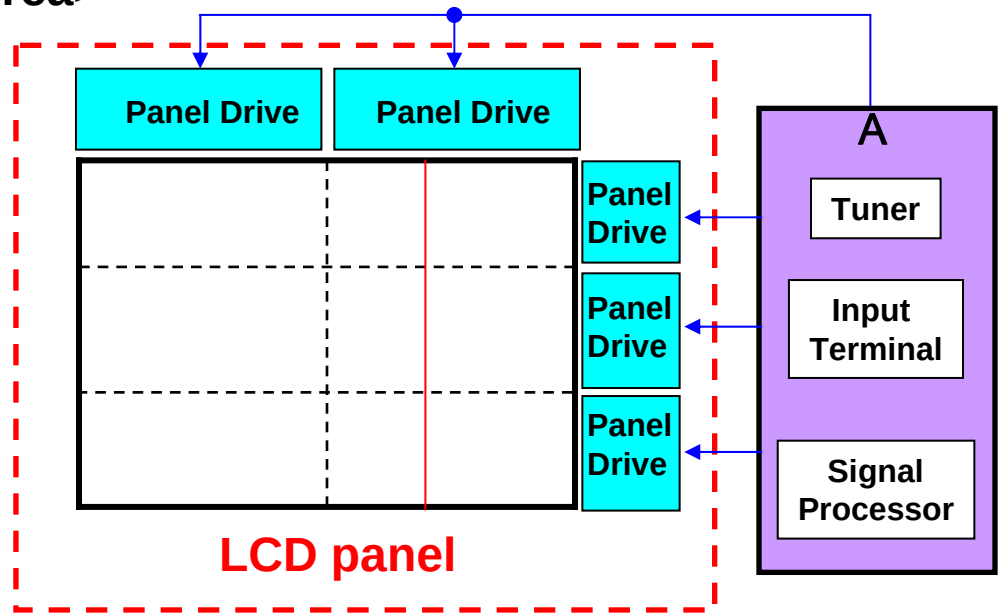


Panasonic ideas for life

Picture Defect (5)

<Symptom>Vertical line

<NG Area>



<Defective parts>

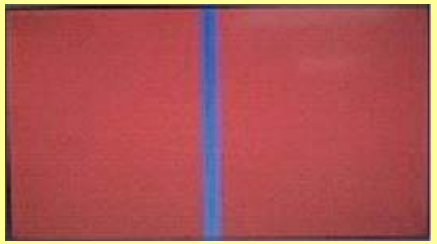
Panel

<Actual Symptom>

Symptom: Thin vertical line



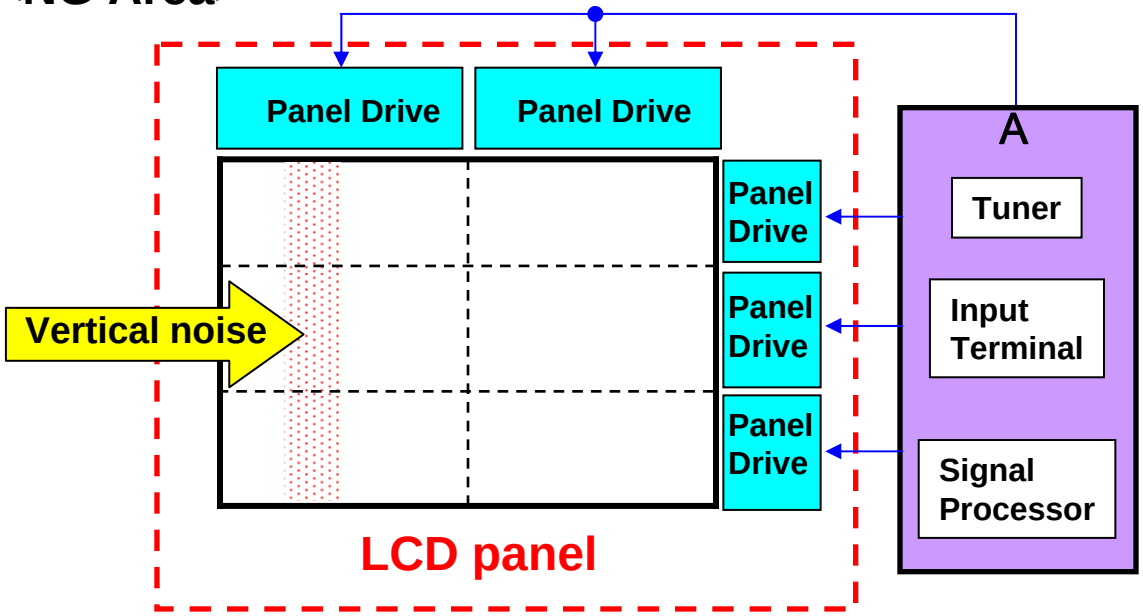




Picture Defect (6)

<Symptom>Vertical line noise

<NG Area>



<Defective parts>

Panel or A board

<Actual Symptom>

Symptom: Vertical noise

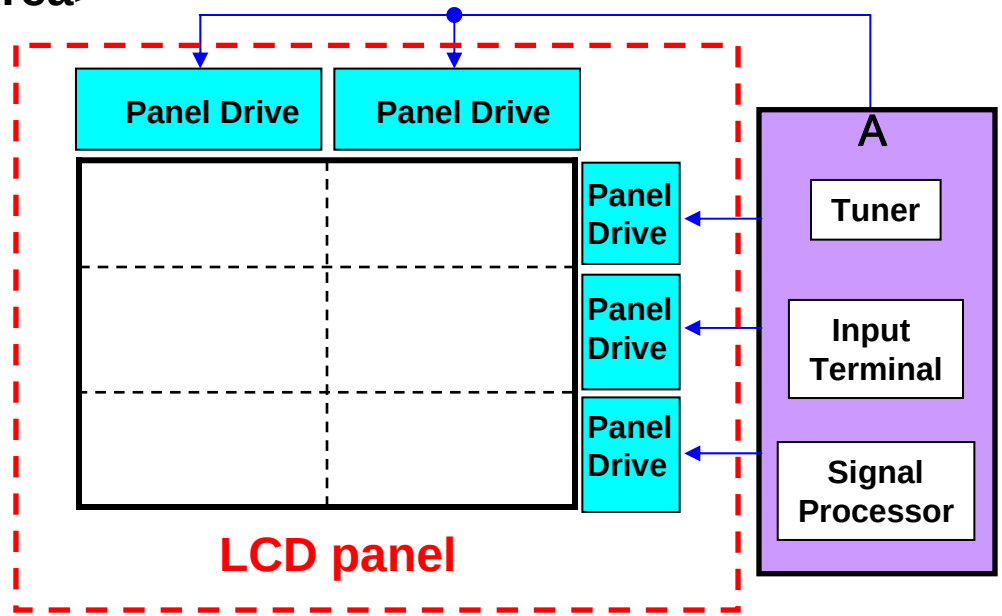


Panasonic ideas for life

Picture Defect (7)

<Symptom>Sub picture NG

<NG Area>



<Defective parts>

A board

<Actual Symptom>

Symptom: Sub picture NG

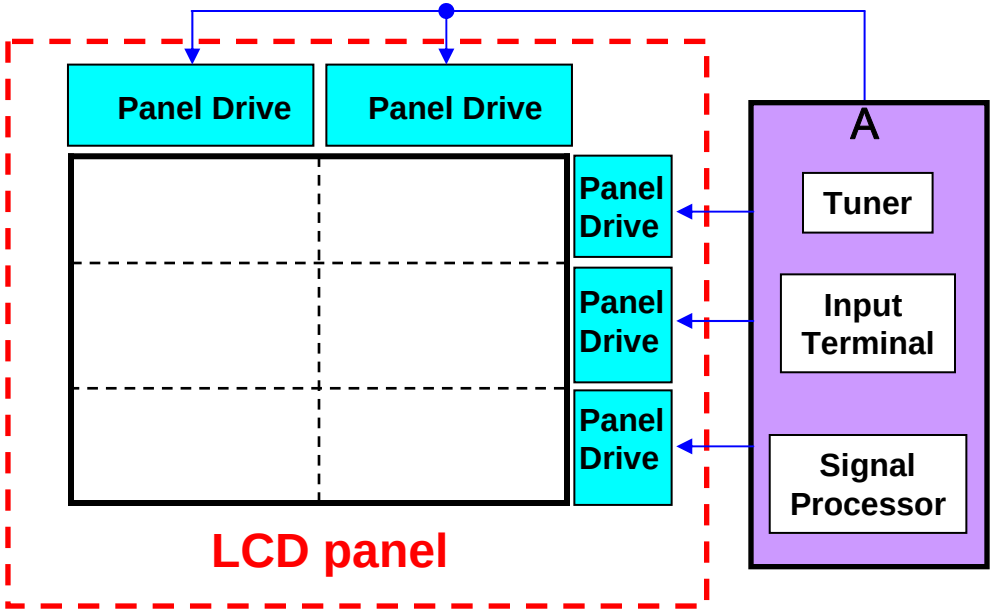


Panasonic ideas for life

Picture Defect (8)

<Symptom>Non uniformity color

<NG Area>



<Defective parts>

Panel

<Actual Symptom>

Symptom: Irregular color



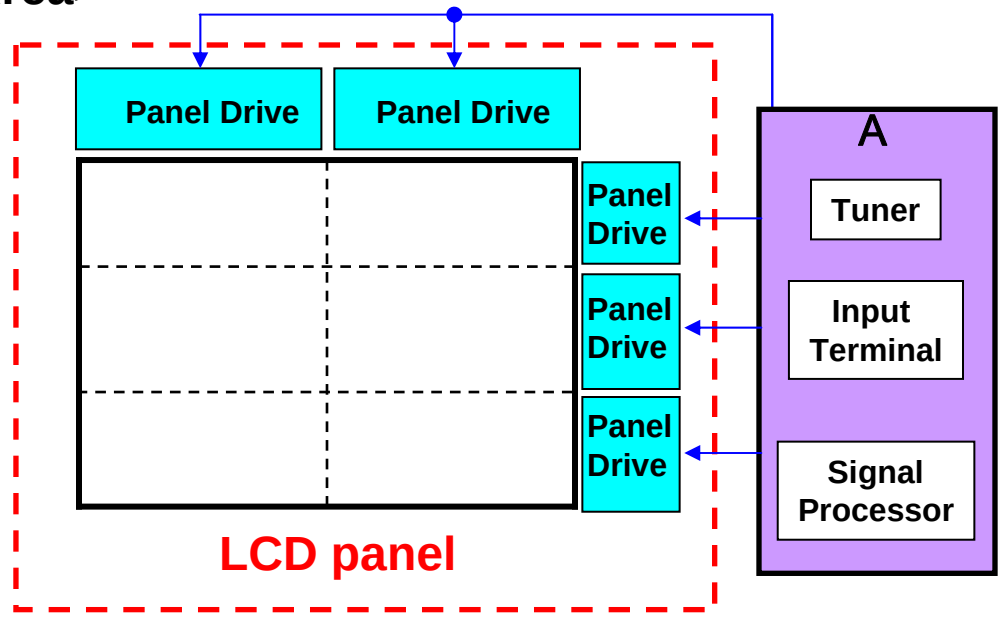


Panasonic ideas for life

Picture Defect (9)

<Symptom>Vertical lines all over screen

<NG Area>



<Defective parts>

Mainly A board, in some cases panel

<Actual Symptom>

Symptom: Vertical line all over screen



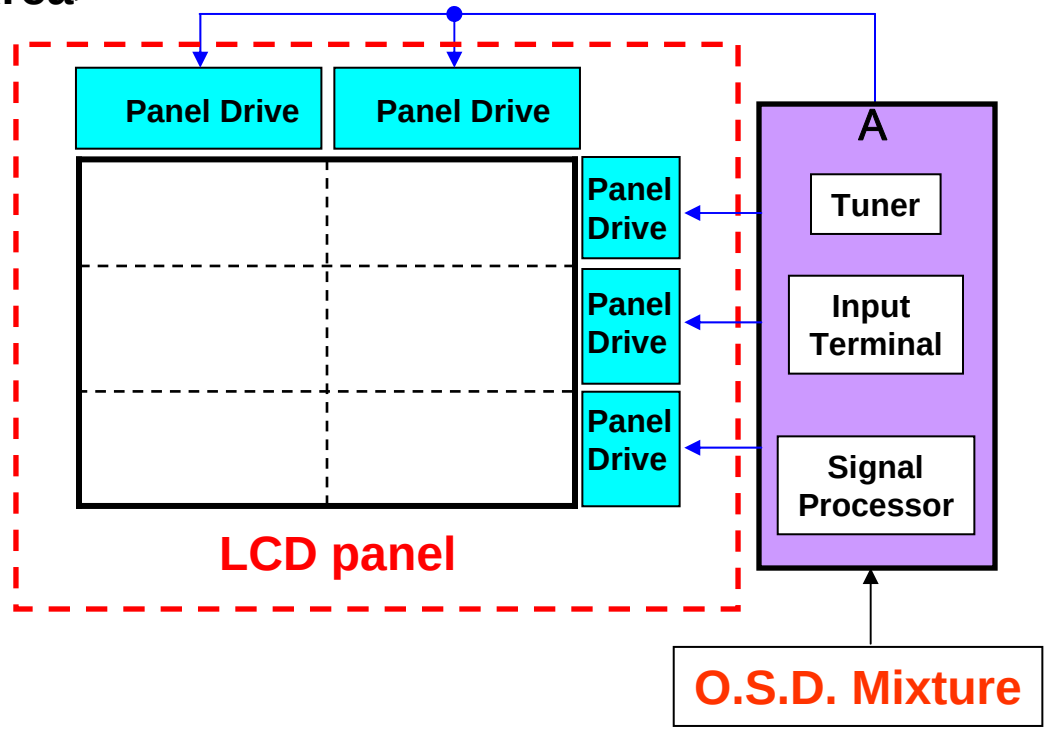


Panasonic ideas for life

Picture Defect (10)

<Symptom>O.S.D. trouble

<NG Area>



<Defective parts>

A board

<Actual Symptom>

Symptom: OSD trouble

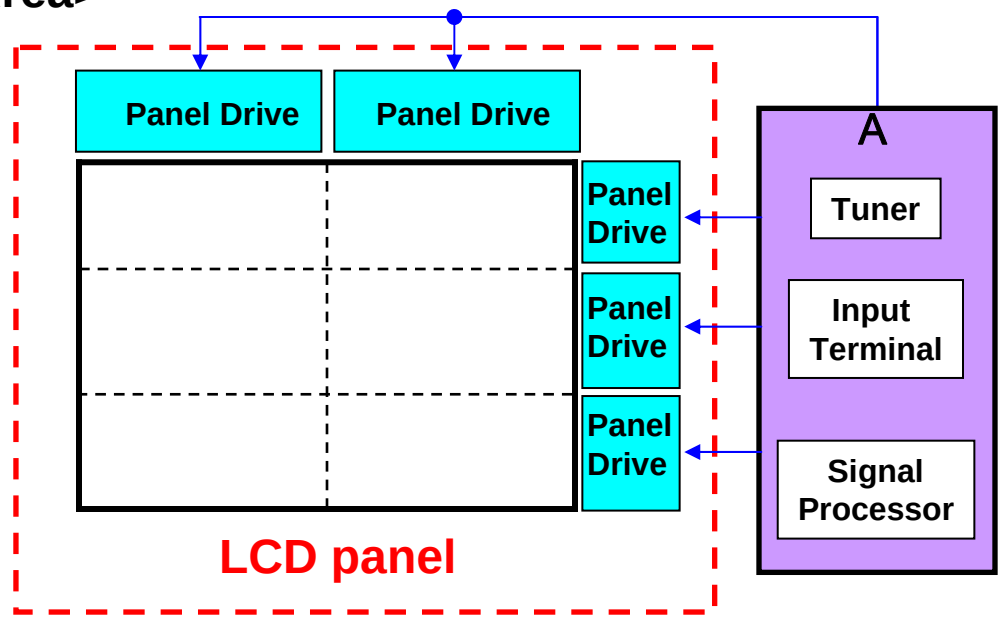
(Color is normal)



Picture Defect (11)

<Symptom>Abnormal color

<NG Area>



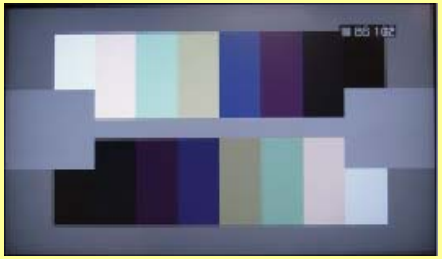
<Defective parts>

A board

<Actual Symptom>

Symptom: Abnormal color





Panasonic ideas for life

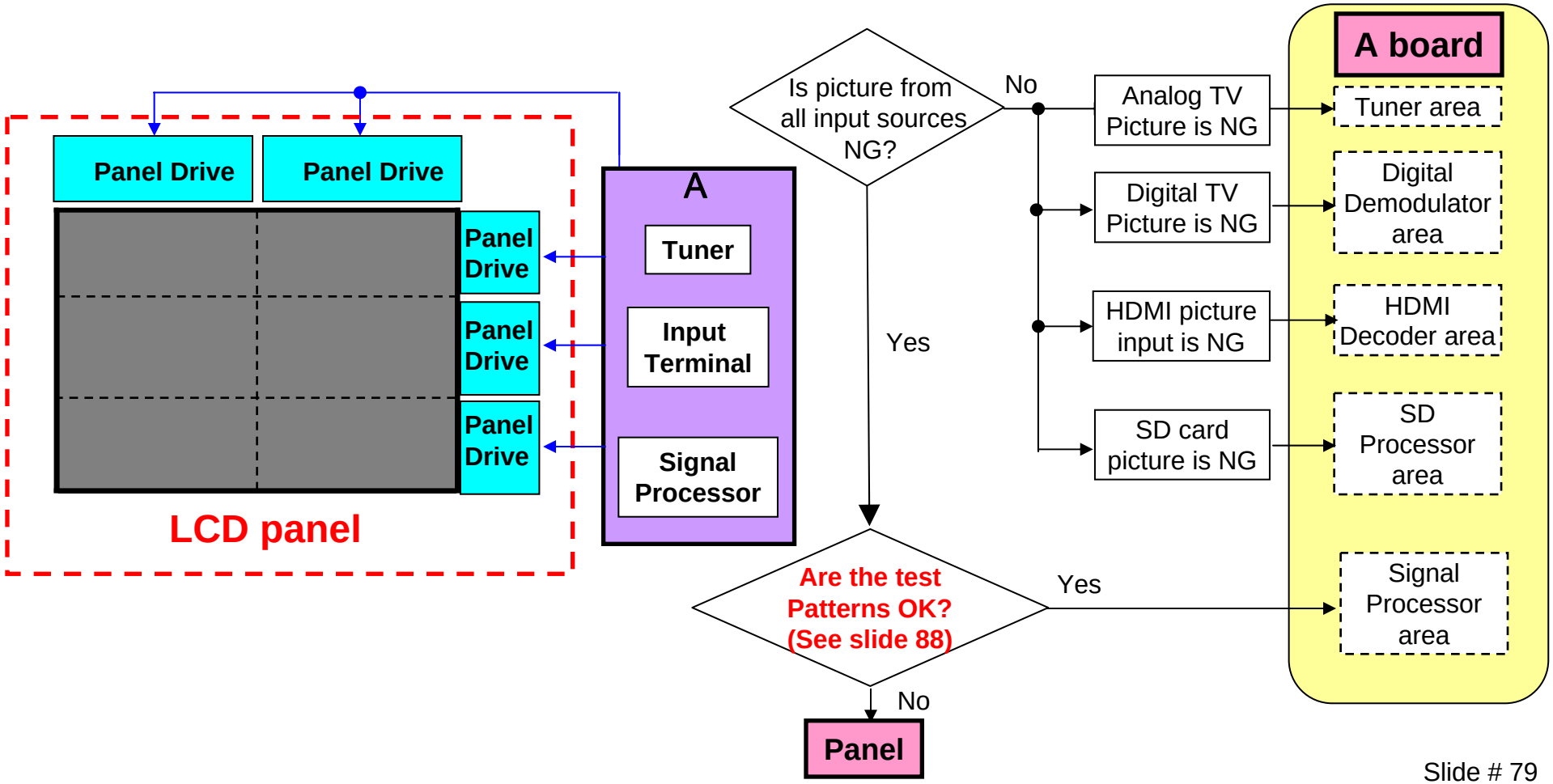
Picture Defect (12)

<Symptom>No Picture with Normal Sound

<Actual Symptom>

No Picture and Normal Sound
Reason: A board or Panel

<NG Area> All

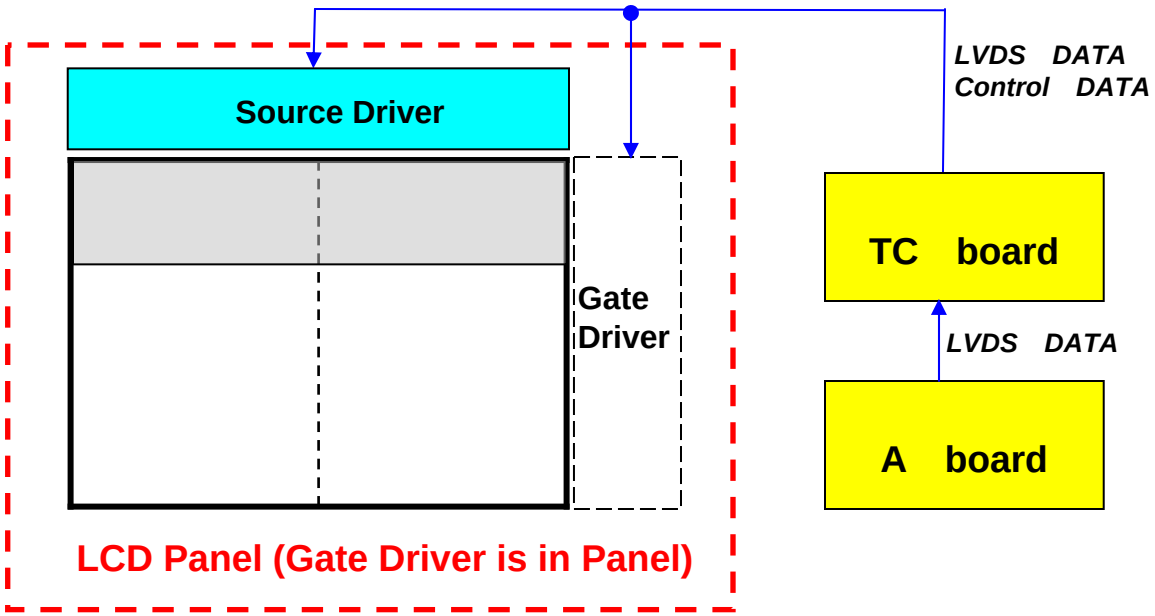


Panasonic ideas for life

Troubleshooting Picture problem (D Series)

Picture Defect (1) (D Series)

Conclusion: Exchange the Panel



Sample Picture

Abnormal area



(LVDS= Low Voltage Differential Signaling)

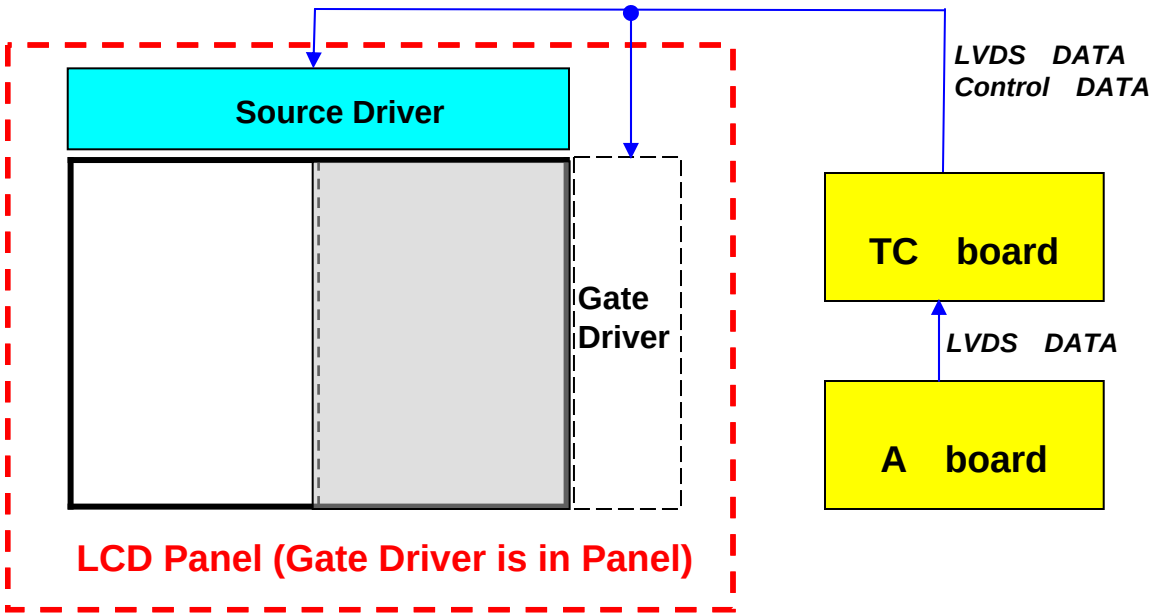
Diagnosis

The Gate driver is defective.
So, exchange LCD panel.

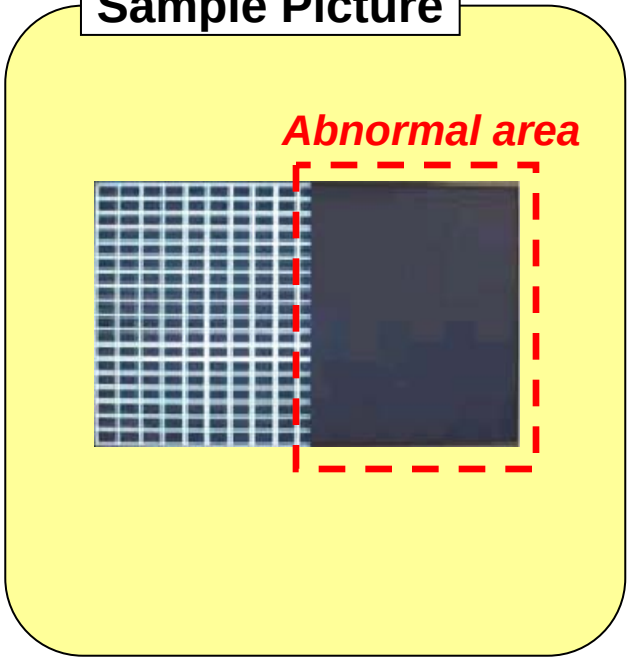
Panasonic ideas for life

Picture Defect (2) (D Series)

Conclusion: Exchange the Panel



Sample Picture



(LVDS= Low Voltage Differential Signaling)

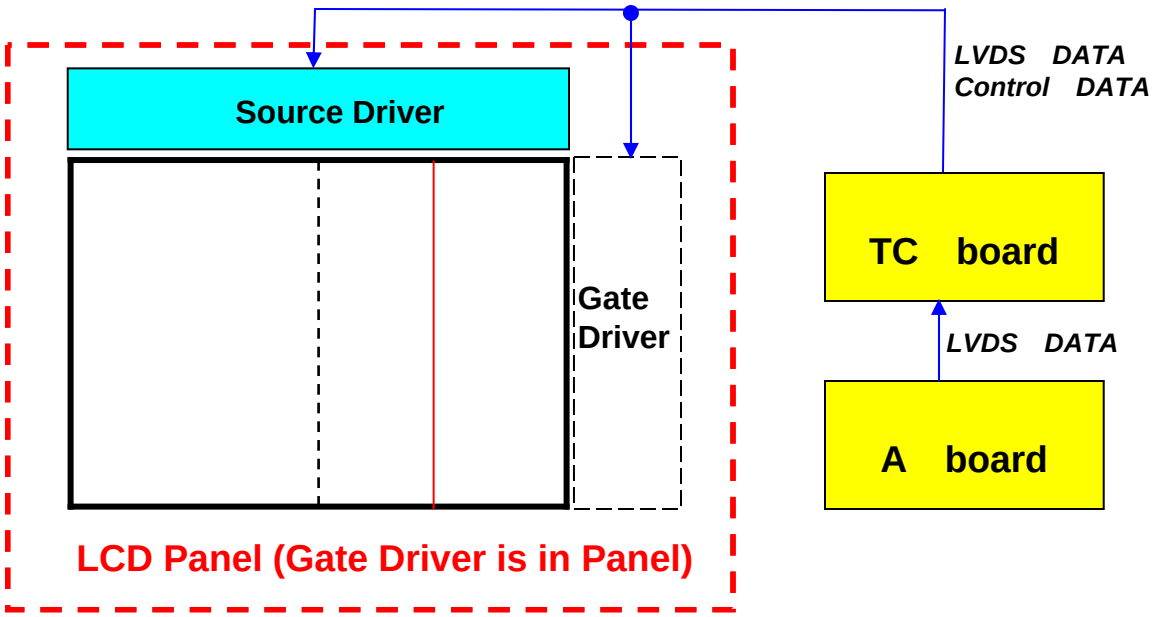
Diagnosis

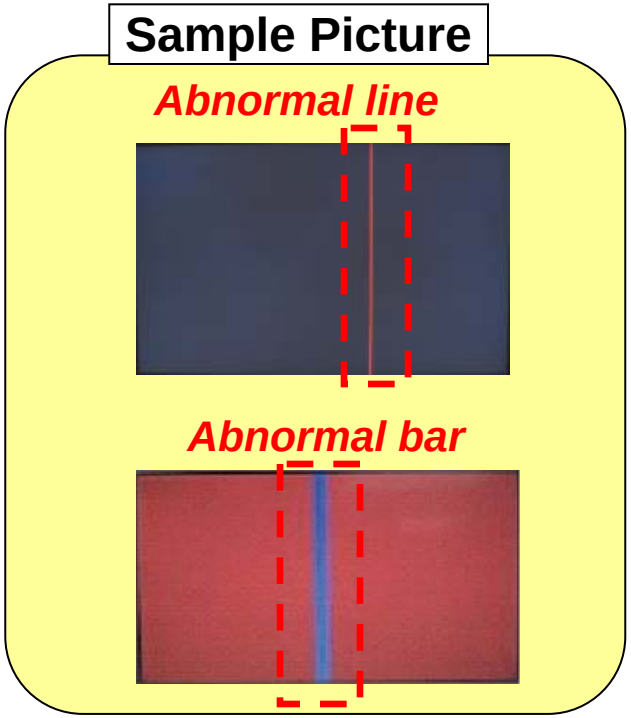
In this case, vertical half of the screen has trouble.
So, half of the source driver is defective.
So, exchange LCD panel.

Panasonic ideas for life

Picture Defect (3) (D Series)

Conclusion: Exchange the Panel





(LVDS= Low Voltage Differential Signaling)

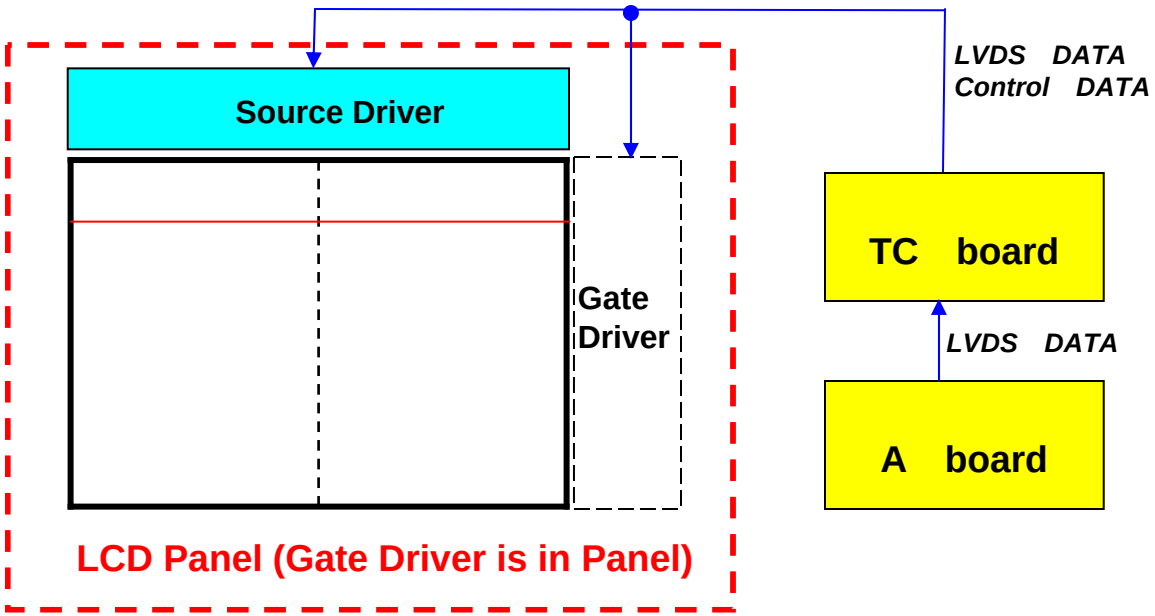
Diagnosis

In this case , small vertical line problem is LCD panel defect.
If IC8001 Nile-TCON is defective, there would be many vertical lines all over screen.

Panasonic ideas for life

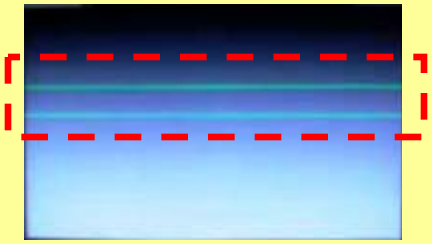
Picture Defect (4) (D Series)

Conclusion: Exchange the Panel



Sample Picture

Abnormal lines



Abnormal line



(LVDS= Low Voltage Differential Signaling)

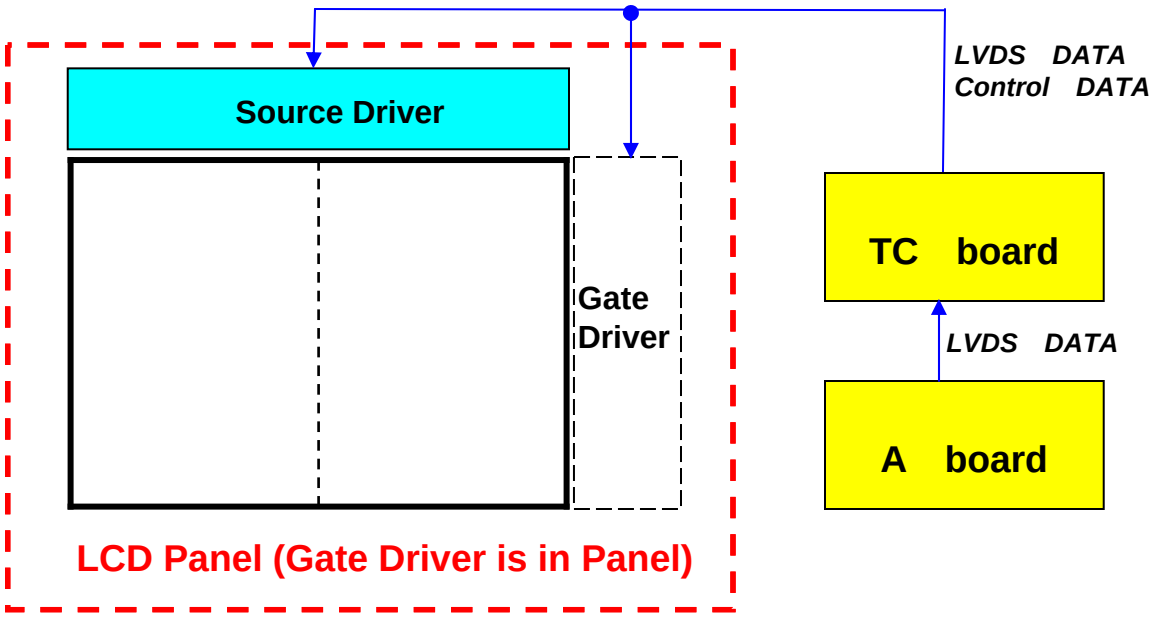
Diagnosis

In this case , a small horizontal line problem is the LCD panel defect.
If IC8001 Nile-TCON is defective, there would be many horizontal lines all over screen.

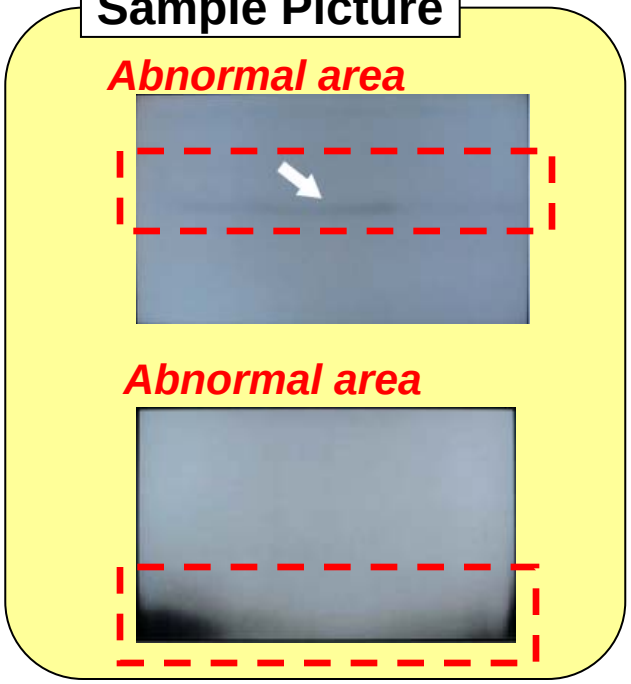
Panasonic ideas for life

Picture Defect (5) (D Series)

Conclusion: Exchange the Panel



Sample Picture



(LVDS= Low Voltage Differential Signaling)

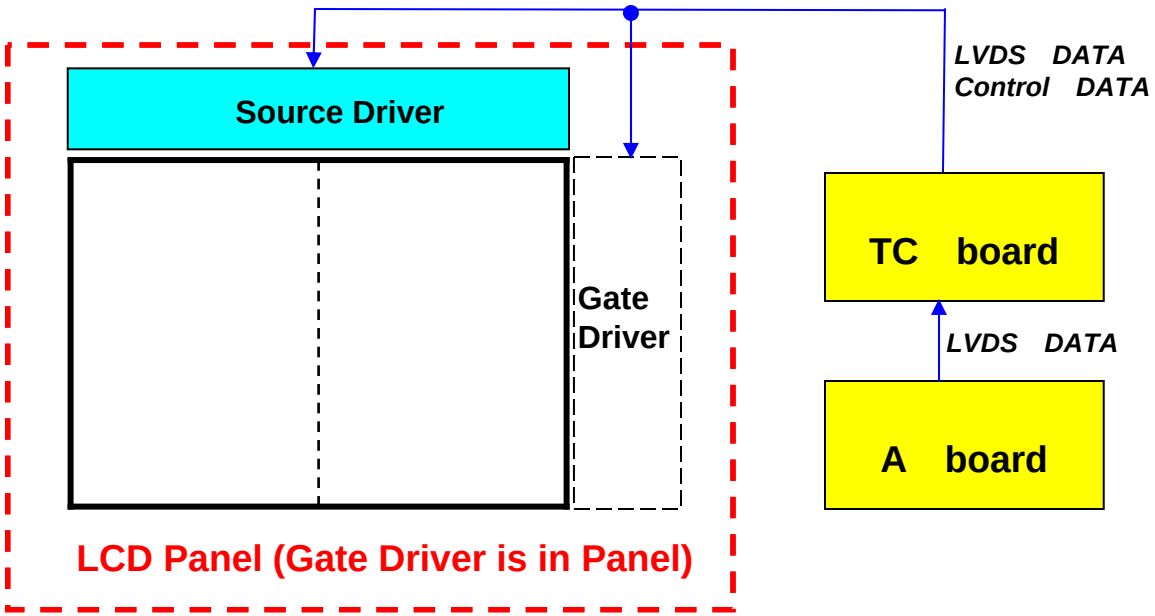
Diagnosis

In this case, the screen color uniformity is abnormal.
The LCD panel is transformed by stress.
For example: mounting screw or physical damage.
So, for such a symptom, we have to exchange LCD panel.

Panasonic ideas for life

Picture Defect (6) (D Series)

Conclusion: Exchange the A board or TC board



Sample Picture

many vertical lines



many vertical lines



(LVDS= Low Voltage Differential Signaling)

Diagnosis

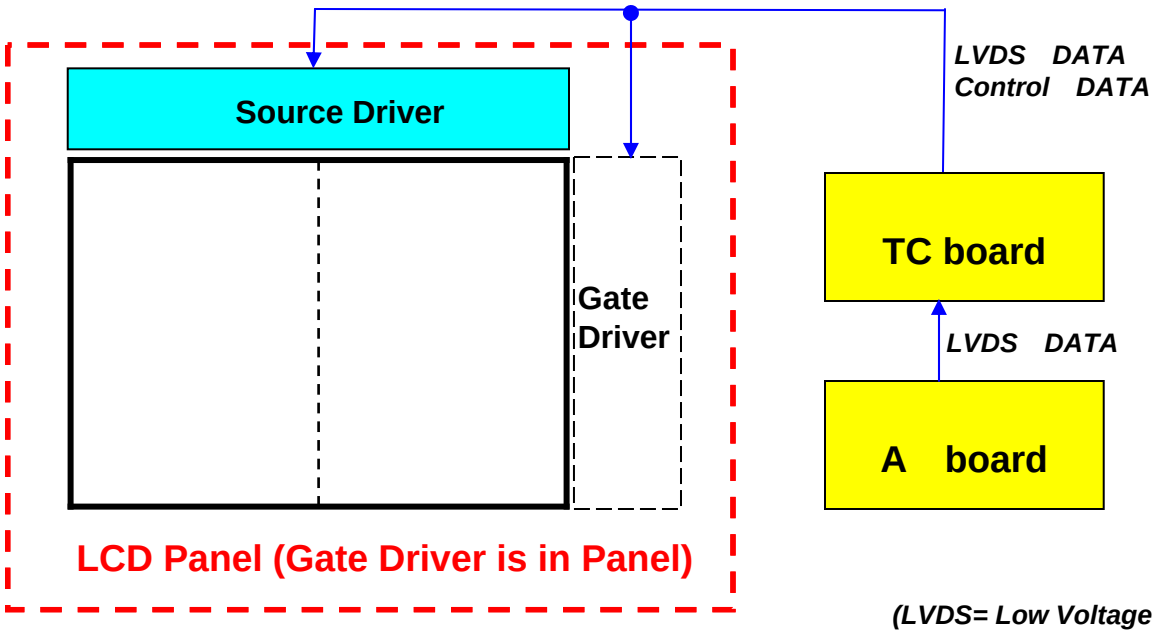
In this case , many vertical lines all over screen may be caused by the A board or TC board.
A one vertical line defect (right photo) would be the panel.



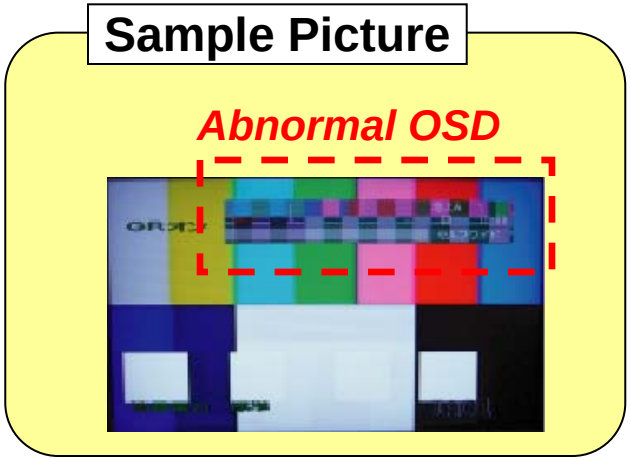
Panasonic ideas for life

Picture Defect (7) (D Series)

Conclusion: Exchange the A board



Sample Picture



(LVDS= Low Voltage Differential Signaling)

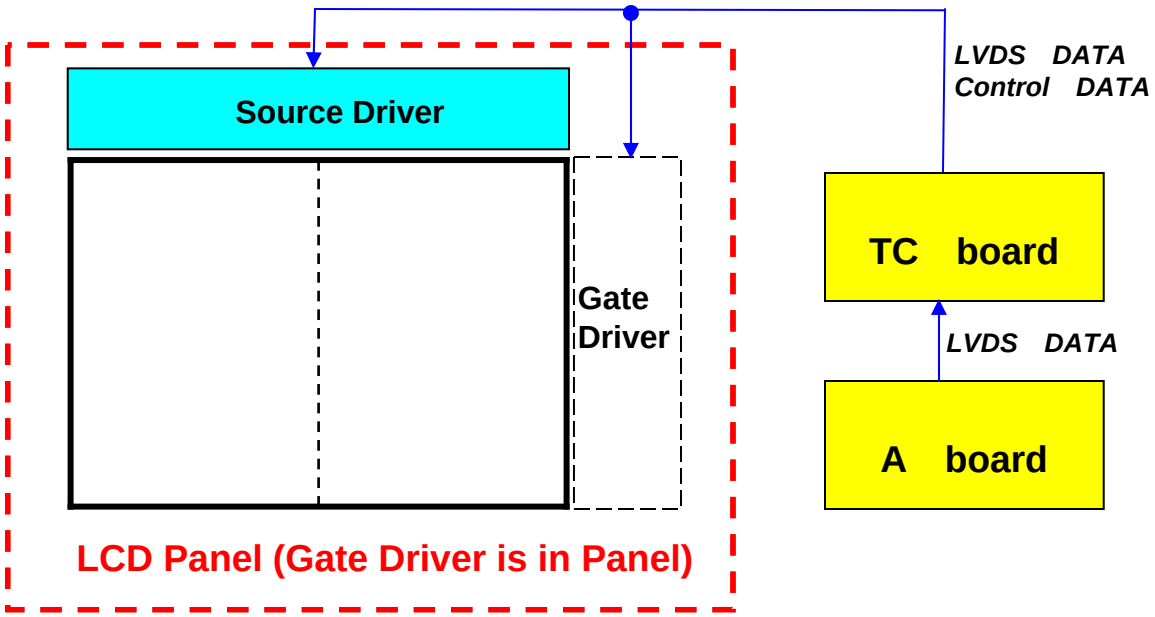
Diagnosis

OSD (On Screen Display) is generated at IC8001 Nile-TCON in A board. So, exchange the A board.

Panasonic ideas for life

Picture Defect (8) (D Series)

Conclusion: Exchange the A board



Sample Picture

Strange color



Strange color part



(LVDS= Low Voltage Differential Signaling)

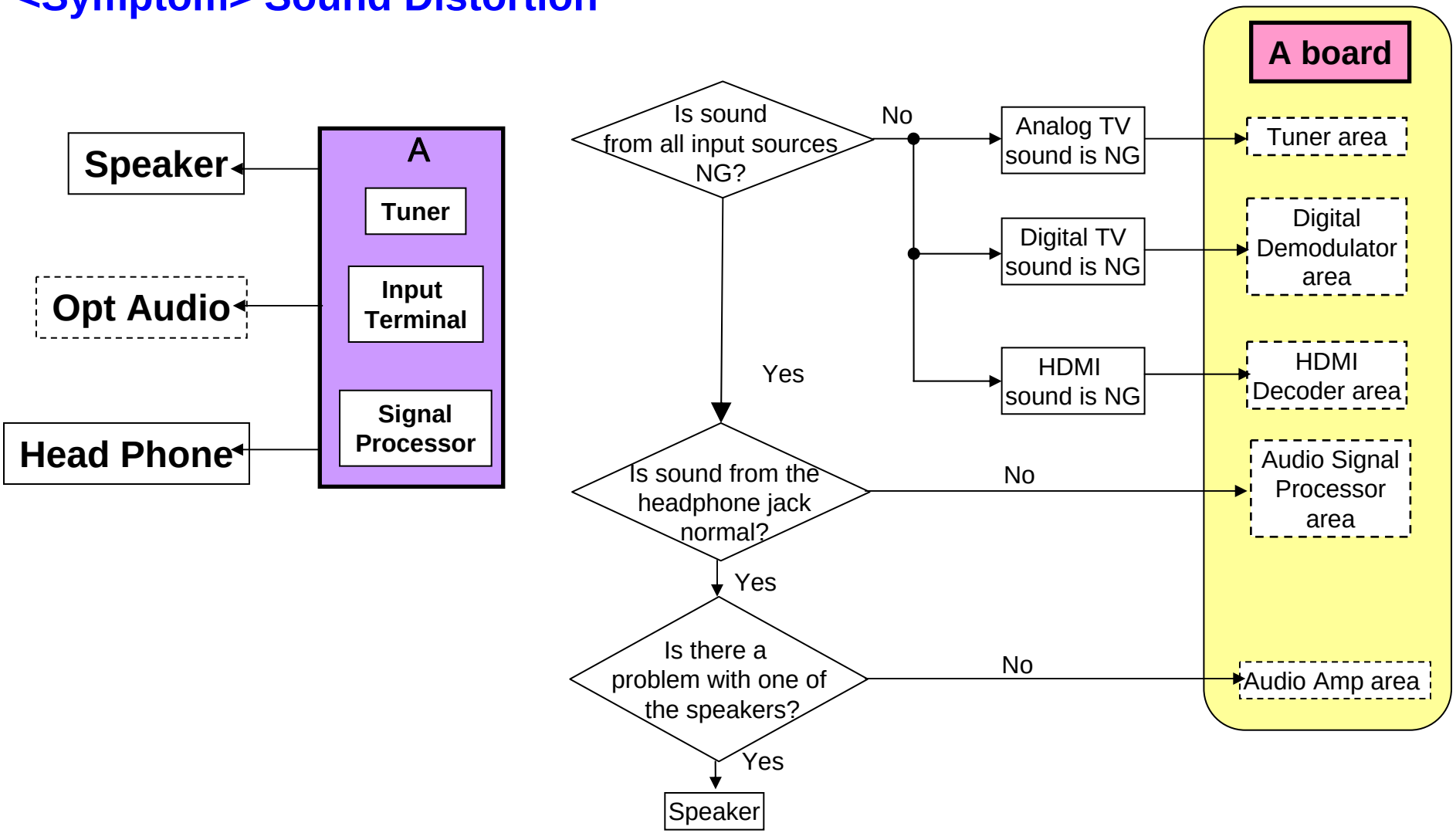
Diagnosis

Strange color or discolor is A board defect, mainly IC8001 Nile-TCON. So, exchange the A board.

Panasonic ideas for life

Sound Defect

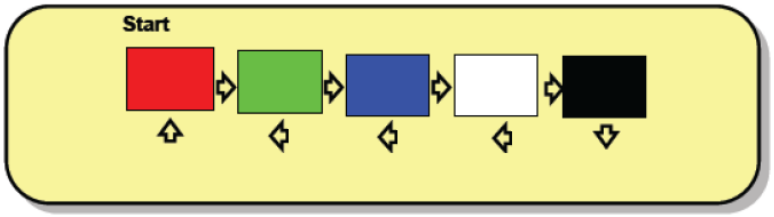
<Symptom> Sound Distortion



Panasonic ideas for life

Panel Free Run Mode

When a picture problem is encountered, the internal test pattern generator may be used to determine whether the symptom is the result of defective A board or the panel. The test pattern is displayed as follows:

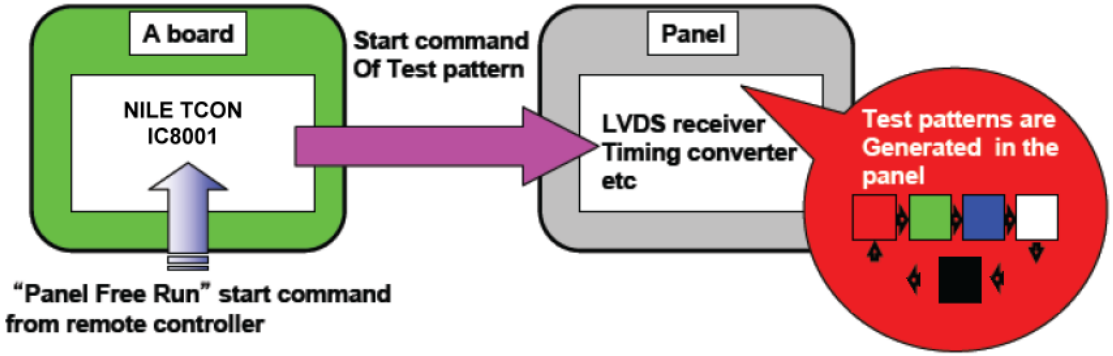


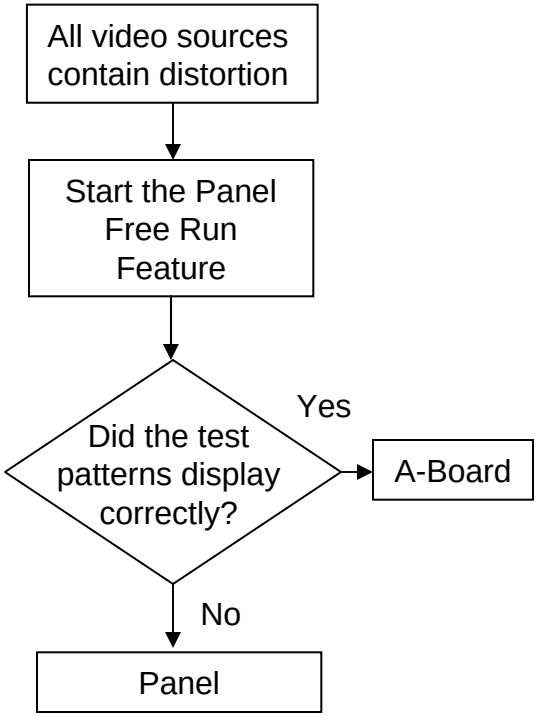
How to enter "Panel Free Run" mode

Same time
- Press "VOL-" button on TV unit
- Press "SUB MENU" button 3 times on remote controller

Main power off to exit.

"Panel Free Run" operation Test Patterns are generated at Panel side





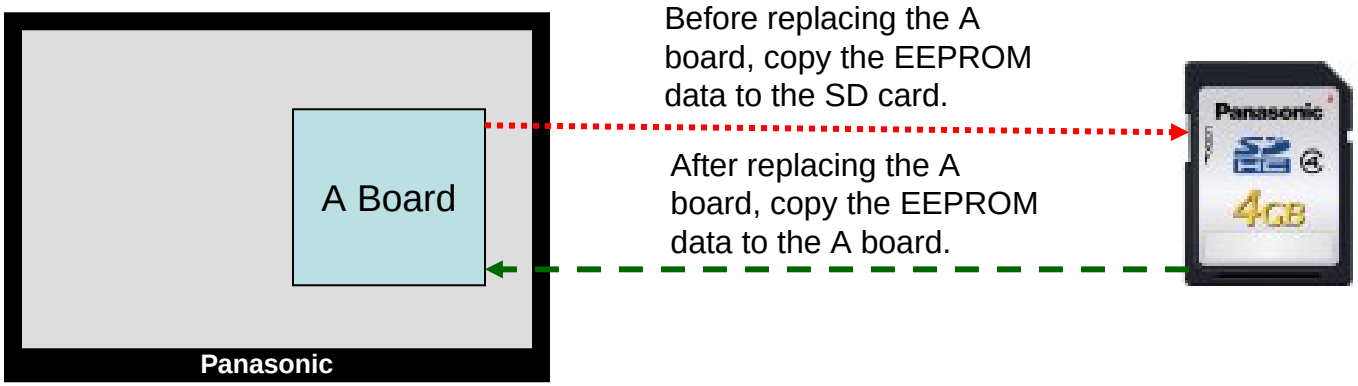
Panasonic ideas for life

Data Copy by SD Card

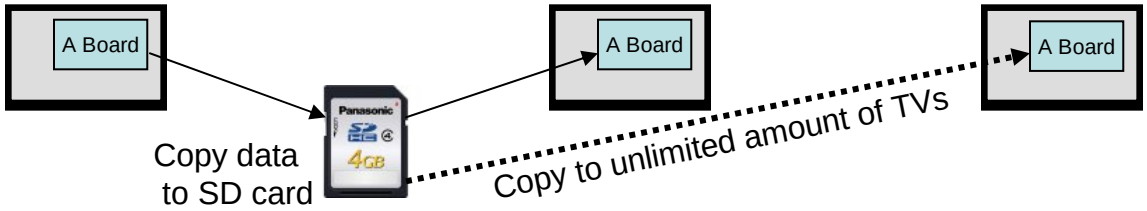
Purpose

User settings data, including hotel mode settings data such as channel scan, adjustment data and factory preset data can be copied to and from an SD card.

A) Board replacement (Copy the data when exchanging A-board):
When exchanging A-board, the data in original A-board can be copied to SD card and then copy to new A-board.



B) Hotel (Copy the data when installing a number of units in hotel or any facility):
When installing a number of units in a hotel or any facility, the data in the master TV can be copied to a SD card and then copied to other TVs.



Panasonic ideas for life

Data Copy Preparation

The SD card requires a startup text file with a ".pwd" extension for copying to the SD card when replacing the A board or installing a number of units in a hotel.

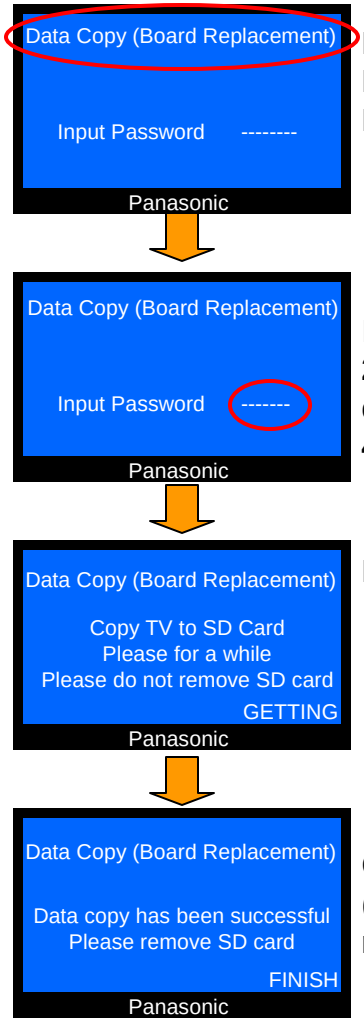
1. Insert an empty SD card to your PC.
2. Right-click a blank area in the SD card window, point to New, and then click text document. A new file is created by default (New Text Document.txt).
3. Right-click the new text document that you've just created and select "Rename".
4. Change the name and extension of the file to the following file name for copying to the SD card and press ENTER.

File name:
(a) For Board replacement : boardreplace.pwd
(b) For Hotel : hotel.pwd
Note:
Please make only one file to prevent operational error.
Do not have any other file on the SD card.

Data copy from the TV to SD Card

1. Turn on the TV set.
2. Insert the SD card that contains the startup file (pwd file) in the SD card slot.
 An On-screen display associated with the startup file will appear automatically.
3. Input the following password for (a) or (b) by using the remote control.
 (a) For Board replacement : 2770
 (b) For Hotel : 4850
 Data will be copied from the TV set to the SD card.
 It takes around 2 to 6 minutes maximum for copying.
4. After the completion of copying to the SD card, remove the SD card from the TV.
5. Turn off the TV.

Note:
The following new folder will be created in the SD card from the TV.
(a) For Board replacement : user_setup
(b) For Hotel : hotel



Data Copy
Board replacement or
Hotel

Input password
2770
or
4850

Performing

Completion
(i.e. Exchanging
replacement board)

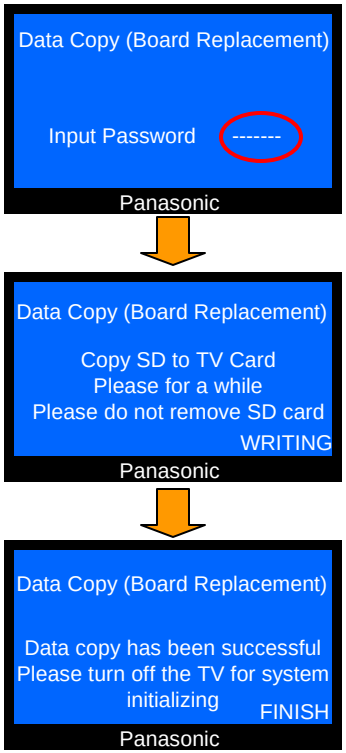
Data copy from the SD Card to TV

1. Turn on the TV.
2. Insert the SD card with Data in the SD card slot.
 An On-screen display associated with the startup file will appear automatically.
3. Input the following password for (a) or (b) by using the remote control.
 (a) For Board replacement : 2771
 (b) For Hotel : 4851
 Data will be copied from the SD card to the TV.
4. After the completion of copying to SD card, remove SD card from the TV set.
 (a) For Board replacement : The data will be deleted after copying (Limited one copy).
 (b) For Hotel : The data will not be deleted and can be used for other TVs.
5. Turn off the TV.

Note:

1. Depending on the failure of the A board, the data copy function for board replacement may not work.
2. This function can be effective among the same model numbers.

(i.e. Exchanging replacement board)



Input password **2771** or **4851**

Performing

Completion

Panasonic ideas for life

Glossary

120Hz Motion Picture Pro4

Even fast-moving scenes are displayed sharply and clearly. With a 60Hz video signal input, 120Hz Motion Picture Pro4 makes 120 frames/second from 60 frames/second. This increases the frame count to allow natural frame-to-frame transitions, for smooth motion images with high resolution. Motion Focus Technology also reduces flicker and effectively suppresses blurring and afterimages.

24P Smooth Film

Enjoy naturally flowing 24p films and familiar TV-like quality. This mode optimizes the number of frames of 24p images recorded from film media such as a Blu-ray Disc™. Advanced source analysis and frame generation produce smooth images that are faithful to the original.

Dynamic Contrast Ratio 2000000:1

Both high contrast and energy-saving efficiency have been achieved in the IPS LED LCD TV by combining the IPS panel, which is known for its wide viewing angle, with a bright, energy-efficient LED backlight. Even dark scenes like night skies are naturally rendered with delicate shades of black. The Intelligent Scene Controller further boosts the image quality.

Energy Saving Mode

The entire 2010 VIERA line-up meets the Energy Star 4.0 requirements. VIERA TVs satisfy the new criteria for the Energy Star program of the U.S. Environment Protection Agency (EPA). This testifies to their top-level energy-saving performance.

Game Mode

In Game Mode, quicker image response increases the enjoyment of video games when a game console is connected to the TV. What's more, VIERA produces the dark images in video games more clearly. This mode works with the anti-image retention (wobbling) function, too.

Glossary

IPS Liquid Crystal Panel

IPS liquid crystal is an abbreviated expression for In-Plane-Switching type TFT crystal, and is a high quality crystal mode that "is beautiful even when viewed at an angle." With IPS, the liquid crystal molecules rotate on a plane parallel to the TFT board by a horizontal electrical field, and therefore in principle, it offers superior viewing angle, color reproduction, and halftone response speed, has little variation in color tone according to the viewing direction and is capable of displaying a natural image.

Motion Focus Technology

The VIERA LCD TV detects areas with motion and activates backlight blinking for only those areas, greatly enhancing resolution.

VIERA Image Viewer™

It's easy to view full-HD images with the SD card slot. Watch and show your photos right after you take them. Simply insert an SD card into VIERA to display photos on the large screen. You can also choose the background music and display effects. It's much more fun when you can view them on a large-screen HDTV with family and friends in 1920 x 1080-pixel high definition and a wide 16:9 aspect ratio.

VIERA Link™

VIERA Link™ allows the interlinked operation of various AV devices using only the VIERA remote control, by simply **connecting the devices to each other by an HDMI cable.**

VIERA Tools

The VIERA Tools user interface makes it easy to use access key functions by pressing a single button. Functions are easier to use, and there's no complicated operation. The explanation is displayed when you press the function's button. Just keep pressing the button to use the function immediately.
•VIERA Tools screen design image is subject to change without notice.
** The screen display varies depending on the model.

Glossary

Wide Viewing Angle

The wide 178° viewing angle ensures clear images even when viewed from an angle. The backlight's wide transmission aperture enhances the contrast between light and dark, and improves motion-image response.